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Biological
& Medical
Serials

STORAGE

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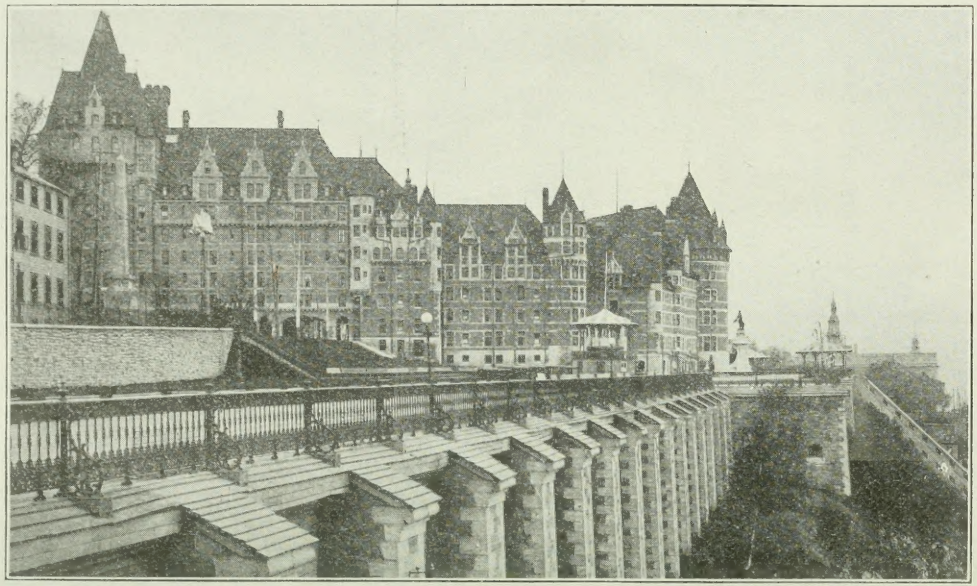
INDIAN PLACE-NAMES

DUNCAN CAMPBELL SCOTT

The race has waned and left but tales of ghosts,
That hover in the world like fading smoke
About the lodges: gone are the dusky folk
That once were cunning with the thong and snare
And mighty with the paddle and the bow;
They lured the silver salmon from his lair,
They drove the buffalo in trampling hosts,
And gambled in the teepees until dawn;
But now their vaunted prowess all is gone,
Gone like a moose-track in the April snow.
But all the land is murmurous with the call
Of their wild names that haunt the lovely glens
Where lonely water falls or where the street
Sounds all day with the tramp of myriad feet;
Toronto triumphs; Winnipeg flows free,
And clangs the iron height where gaunt Quebec
Lies like a lion in a lily bed,
And Restigouche takes the whelmed sound of sea,
Meductic falls, and flutes the Mirimichi;
Kiskisink where the sly mallard breeds
Breaks into pearls beneath his whirling wings,
And Manitowapah sings;
They flow like water or like wind they flow,
Waymouchuching, loon-haunted Manowan,
Far Mistassini by her frozen wells,
Gold-hued Wayagamac brimming her wooded dells;
Lone Kamouraska, Metepedia,
And Metlakahtla ring a round of bells.

TORAGE



CHATEAU FRONTENAC AND TERRACE, QUEBEC

Where the 1916 Congress of the Canadian Public Health Association will be held

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THE WORK OF BUREAUS OF CHILD HYGIENE AND OF MEDICAL INSPECTION IN SCHOOLS

By PETER H. BRYCE, M.D.
Chief Medical Officer, Department of Interior, Ottawa

IN October, 1908, the New York Board of Health created the Division of Child Hygiene, the work carried out under it having previously been performed by several quite independent services of that Board. This work and the methods therefor had become so well understood and so extended that in 1913 it was placed under a separate bureau with a director reporting directly to the Commissioner of Health. The work of the bureau is that performed in most cities by Departments of Health and includes such duties as

1. Registration and control of mid-wives.
2. Establishment of milk stations and treatment of infants.
3. Education of mothers and visitations of infants in their homes.
4. Inspection of nursing homes and homes for dependent children.
5. Inspection of children of pre-school age.
6. Inspection of school children.

As the registration of mid-wives includes instructions for their guidance, especially in the care of the new-born child and in the education of prospective mothers, it is plain that the result of the Board's operations have illustrated the fact that in the care of the public health there is no stage in the life of the individual whether prenatal or post-natal, which may not come within the functions of State or municipal control if thereby lives can be saved and the individual become a more effective citizen. That New York has obtained remarkable results through her efforts to improve the public health is seen in the fact that almost for the first time the death rate of infants under one year was in 1914 less than ten per cent.

How satisfactory this rate is is shown by the following table:

Deaths Under 1 Year per 1,000 Births.

1. England and Wales	105
2. New York	94.6
3. Boston	103.7
4. Baltimore	154.6
5. Ottawa	199

The work of child saving during the period of infancy is to-day being prosecuted along many lines, and within recent years the State in more progressive countries has undertaken the hygienic oversight of school children and the medical inspection of schools. The years between infancy and school age, however, have as yet in few instances had any special machinery for the supervision of the child, yet it is evident from the many defects found in children upon entering school that these must have been developed in the previous period. Recognizing this fact the report of the New York Child Welfare Bureau for 1914 says: "The Bureau feels that the most logical way to reduce the number of school children with physical

defects is to treat them before they enter school rather than after entrance. . . . . Prevention and remedial measures undertaken at this time will do much toward the elimination or diminution of physical defects found in school children."

Such work indeed has been undertaken by the Bureau to a limited extent in 1914 by urging mothers to bring the older infants to the milk stations, where all presenting underwent a complete physical examination with the consent of the mother. The nose, throat, teeth, heart, lungs, spine, limbs, nutrition, nervous system and so on were carefully examined and complete notes made, while the children were referred for treatment to either the family physician or to some hospital or dispensary. The mothers were further instructed how to care for the nose, eyes, teeth, etc., of their children. Most interesting are the statistical results of this examination of 1072 children. Of the total 69.76 per cent. were found to have physical defects of which 54.29 were general defects and 15.47 defects of the teeth only. Owing to the age of these children defects of seeing, hearing, etc., were not pushed very much; but that defects of such organs exist are seen in the table:

	Per cent.
Defects of vision	3.3
Hearing	1.7
Defective nasal breathing	25.37
Hypertrophied tonsils	24.5
Defects of nutrition	21.28
Heart disease	1.2
Pulmonary disease	3.1
Orthopedic defects	8.5
Nervous disorders	2.1
Defective teeth	30.39

In all 1,298 defects were recorded in 748 children found defective. What this means in any population between 2 and 6 years may be appreciated when it is understood that within this period are 436,000 children in New York or nearly one-tenth of the population. As supplementing this precise information the Annual Report for 1914 of the Chief Medical Officer of the Board of Education for England states that children upon entering school there are found to be suffering from diseases similar to those mentioned to the extent of from 10 to 30 per cent. in different areas.

Such statements of facts regarding preschool life conditions naturally lead us to the question of the medical inspection of school children. First begun casually in New York in 1897 it became organized in 1905 when it was determined that in addition to inspection for contagious diseases each child should undergo a separate physical examination for the detection of defects. After a routine inspection of all the children of a school room at the beginning of a term, medical inspectors thereafter devoted their time to the separate examination of each child, while nurses made daily visits to the school rooms and picked out any suspected cases of disease and such were sent home with a note; while if contagious disease was suspected the proper officer to deal with it was notified. After some experience it was found, however, by house visits by the nurses that only some six per cent. of the children whose parents were notified were actually receiving medical treatment. It became clear that the system would be only a partial success if the citizens were not to have the inspected children properly treated and much public money would thereby be uselessly expended. The result has been that within the last three years a greatly increased staff of trained nurses has been appointed to visit the defective children in their homes and induce parents to provide treatment. Within a year this system resulted in 87 per cent. as compared with 6 per cent. previously receiving treatment.

The Act for the compulsory medical inspection of school children was passed in England in 1908 and progress has become extremely rapid. The fact that some 700,000 children enter school every year makes the extent of the task evident; but provision not only for inspection but also for treating defects has so increased that in 1915 London had facilities for treating 125,486 defects, while 180 school clinics exist in different parts of England.

From this summarized account of the work to be done in any community and the means for accomplishing it we may turn to what is being done in Canada. While in a considerable number of cases the inspection of school children has begun we find that it is following much the same stages as it did in New York. It is true, however, that to-day in most of our larger

cities the work of child hygiene has been inaugurated, while in such cities as Toronto, milk stations and the care of infants has been highly developed with a systematic house to house inspection by the nurses of the Board of Health who are directed by one chief of staff. It is quite apparent from such illustrations that no department of city government is placed by the duties laid upon it in so favorable a position to carry out all the comprehensive health measures of the complex life of a city with the same promptness, economy and efficiency as is the Local Board of Health. The social service workers of hospitals are indeed of much use in following up cases to their homes which appear in the clinics, and school physicians and nurses directly appointed by Boards of Education can do much good work though separate in their operations from the Local Board of Health; but the scope of child hygiene as already illustrated makes it so clear that the entrance of children into school is but a continuance of the life of the pre-school period that there must be great duplication of work if school nurses are to follow children with defects to homes very often the ones already under the inspection and supervision of the Board of Health nurses for disease in children of earlier years.

As an accurate medical examination of school children in north temperate climates whether in Europe, the United States or Canada, shows everywhere the prevalence of similar defects and diseases in the children both of pre-school age as well as of school age, it is plain that that system will be the most economical in operation and most productive of good results which unifies all the work of child hygiene even from the pre-natal period to that of entrance to school up to the final examination on leaving school of the boy or girl with a view to directing him toward that occupation in life to which he is seemingly best fitted, both mentally and physically. This is illustrated by the report of the Toronto Department of Public Health in the Division of Child Hygiene for the month of October, which gives the following:

Treated at Sick Children's Hospital, out patient clinic, 1,534 cases; baby clinics at hospital and 12 other clinics, 2,264 cases; clinics at day nurseries and homes, 88 cases; mother craft clinics classes 33, dietitians 19, nurses 44, mothers 197; day nurseries and homes with cases dealt with, 3,206; milk depots total attendance, 1,581; pre-natal clinics, 76; Division of Public Health Nurses (report for November), patients under supervision, 6,418; families under supervision, 6,473; visits by nurses, 9998.

The need for establishing the closest relations between the work of the hygiene of the infant and that of school age may be judged from the fact that a carefully conducted examination of 2,064 Toronto school children recently by a specialist from the Feeble-Minded Clinic of the General Hospital showed some 8 individuals or over 3 per cent. to be not only backward but feeble-minded.

Results of Examination of 2,064 School Children in Four Different Toronto Schools.

	School No. 1 Children from homes of British Immigrants	Children of 20 different nationalities	Children of well to do classes	Children chiefly of better class mechanics.
1. Total Children	115	604	714	631
2. Morons (highest type of feeble-minded)	2	7	8	7
3. Imbeciles	4	25	6	5
4. Idiots	..	..	1	..
5. Border line cases (*)	3	3	6	3
6. Deaf and dumb	..	..	1	..
7. Percentage of all classes	5.2%	5.3%	2.1%	1.9%

Dr. A. F. Tredgold, a foremost authority on the feeble-minded in England, discussing the underlying causes of feeble-mindedness expresses clearly his belief that variations from the normal in the constitution of the germ in the feeble-minded child is pathological and due to environment (whether pre-natal or post-natal) and while fully recognizing hereditary influences says: "So many of the manifestations of the neuropathic diathesis depend upon the nature of the early education, the physical health, and the conditions and modes of life pursued by the individual, that the precise enumeration of those who are, or are not affected with hereditary taint is very difficult." It hence becomes of supreme importance that in this connection, as in families where tuberculosis has been or now exists, every social and public health influence possible be brought to bear from earliest babyhood onward to school

*Border line cases not included in percentage totals. Total school population in Toronto 70,000; at above percentage there are over 2,000 feeble-minded pupils in city.

age, for the removal of defects, whether physical or mental, in order not only to prevent retardation but also to promote normal development. Clearly, if 12 per cent. of a population is within the ages 0 to 4 years, the preventive work to be done when children enter school will not only be much less but all the benefits of preventive or curative treatment, earlier, will have been obtained.

We have seen how in many directions the benefits of marine hospitals for scrofulous children, of preventoria in forests and of open-air schools have enormously benefitted anaemic and tubercular children, so that to-day the matter of their extension becomes one only of the evolution of methods in child hygiene. The primary question to be considered is social efficiency and how it is to be obtained. Every fact in the field of science applicable to this end must be utilized. The wars of the 19th century were fought with the weapons and the development of the art of war of that period; so the 20th century with its ever-increasing urban populations has its own problems, and these will only be solved by the application of the best methods which have been evolved in keeping with the knowledge of to-day.

In Canada at Confederation Separate schools became a part of our constitution, and any system of adequate school inspection must be worked out with a view to not only unity of idea and completeness of machinery, but also with a full recognition of the fact that both economy and efficiency demand that it be a part of the common public health machinery of the municipality. This can only be effected by the whole work being placed under the Department of Health, and its chief executive officer, so that the medical inspection in the school and the subsequent visiting and clinical work can be directed from a common centre toward a common end. Experience, as has been illustrated in New York, makes this plain; while the Boards of Education in large centres of England have found it most expedient and economical to employ as medical inspectors of schools under the compulsory Medical Inspection Act of 1908 the Medical Officer of Health of the municipality. Indeed, some 75 per cent. of the medical school inspectors appointed during the first year of the operation of the Act were such officers. Everywhere with the evolution of exact scientific methods in the diagnosis and treatment of mental and physical defects and diseases, the importance of fully equipped scientific departments of health in each municipality is becoming increasingly obvious, since the saving of life of the native-born Canadian is a much more practical and patriotic procedure than the increase of population through the introduction by immigration of those who must be educated into Canadians.

A FEW HINTS TO THE MEDICAL PROFESSION IN RELATION TO PUBLIC HEALTH WORK

By DR. GEORGE E. DeWITT,

M. H. O., Wolfville, N.S., Conference of Medical Health Officers of Nova Scotia, 1915

MEDICAL inspectors of schools having a prominent place on the programme of the conference, and medical inspection having become a recognized necessity in all places where the system is in vogue, I wish to refer to a few of the conditions that exist and also to refer to some matters that are not taught in the schools of Nova Scotia.

The Feeble-Minded Children.

What is to be done with the feeble-minded children in the schools? In most of the schools of the province the feeble-minded children stand side by side with their more intelligent neighbors, without any effort being made by the teachers or school authorities to segregate and teach them in a class by themselves. The International Congress on School Hygiene at Buffalo emphatically made the pronouncement: "For a rational policy for controlling feeble-mindedness, it is essential that we recognize the condition in childhood. Our compulsory school laws bring every child to official notice." Every case of feeble-mindedness should be recorded at the proper time. The parents should be informed of the condition of the child. If the feeble-minded children were segregated in the schools and taught in classes by themselves, they would not be a hindrance to the other pupils. These classes would insure diagnosis and treatment at an early age. A special record of these cases should be kept in the schools, for we learn from the history of the courts and penal institutions that it is the mentally unfit or defectives which make up a large portion of the criminal classes. My reference to the mentally defective or feeble-minded in schools, because of the many difficulties attending the weeding out or segregating of this class of individuals, may not elicit the interest and attention it should; or thorough investigation it demands. We all know, however, that in nearly all, if not all, communities, this class of people exist, they are allowed to marry and transmit their hereditary traits from generation to generation. If, as we believe, the prevalence of feeble-mindedness can be effectually reduced by educational methods, the remedy largely depends upon the medical profession. The physician often has access to family councils, his advice is eagerly sought and generally followed, he has exclusive opportunity to teach and inculcate certain accepted principles of practical eugenics. It is not my intention, however, to allude in my brief reference to this subject to what is being done in countries where means are employed to segregate this class of delinquents in institutions and colonies, and where they enact laws preventing marriage, etc., but more especially, to emphasize the necessity of diagnosing under expert inspection such pupils in the schools who are a menace and check to the normally constituted pupil, keeping a correct record of them, the data of which may become useful in the province of Nova Scotia, when a more active campaign is carried out for the care and consideration of these unfortunates. I trust the day is not far distant when, in this province, there will be a mental classification of the children in the public schools, so that the normal child may not be hampered by the mentally defective, and the bright child may have a better opportunity to find its proper level.

Teaching Sex Hygiene in the Schools.

I have on other occasions advocated the teaching of sex hygiene in the

schools. I know there are those who hold up their hands in holy horror against such an innovation, declaring that the child should not be taught such things. I know also there are many of high authority who claim that sex hygiene should be taught in the compulsory schools, for the reason, that the boy and girl to-day do not receive in the home, the church or the school sufficient knowledge to guard them against the social evils and the consequences of their ignorance. I believe that the boy and girl should be taught sufficient hygiene, that they may understand what they are as human beings, so that they may protect themselves against the dangers into which the uninformed youth are now thrown, not so much through their own fault, as because they have not been taught the things which they must know to guard themselves properly. The personal defence of the individual can only be strengthened by an intellectual comprehension of the proper and misdirected use of the reproductive organs. We admit that the situation is a delicate one, and that this information must be conveyed by men and women of breadth and strength of character, as teachers. I know that I am in the minority in this country when I advocate the teaching of sex hygiene in the schools, and in claiming that such is a function of the public schools, but if this knowledge or instruction is not imparted in the home, those who oppose it in the public schools must bear the blame of the countless lives wrecked through ignorance. I admit that this training ought to begin in the home, but all teachers ought to be equipped to serve the younger children, and for the older pupils specially trained instructors are needed. It is not so much the teaching of sex that should be taught them, but the reproduction of life, by demonstrating the use of plant life, as a means of conveying the theory of reproduction, with the gradual unfoldings of the theory of inheritance and the importance of parenthood.

I do not think I am arrogating to myself too much authority, when I say that we of the profession of medicine must see to it that the rising generation is not permitted to grow up in ignorance of such matters. Instead we must insist that these matters of vital importance must be taught in the public and private schools, because it is so seldom that those in the home possess the requisite knowledge and ability to teach the child what it should know, or appreciate just when the child is old enough to apply such knowledge.

There is a foul stream in human life, of which the medical profession has scarcely touched its fringe with publicity similar to that which it gives to other matters relating to public health—"venereal diseases." The silence is so portentous that one hardly dares to break it. The medical health officer is supported by lawful authority to exclaim against insanitary conditions of all kinds that breed infection and reduce vitality, and bring into play the forces which the law provides for their amelioration and correction, but the curse which transmits its dire traits from generation to generation, producing tragedies in human lives, is fostered by a word which written in large type upon the ethics of the profession, prints the word "hush." The silence in the home, the church and the school, and little or no effort is being made by the profession to educate the rising generation in sex hygiene, so that it may guard itself against disaster accruing from ignorance. This makes the profession contributory and to a certain extent responsible for the tragedies in human lives brought about by this disease; while the teaching of sex hygiene in the schools upon a biological basis may not directly eradicate the social evil and its characteristic diseases, it will be a stepping stone to protect many a young man and woman and reduce the sum total of evil results, and pave the way in the future to a franker elicitation of knowledge necessary to guard human life from the disasters caused by venereal disease.

In the report of the Commission of Conservation, held at Ottawa, 1914, Dr. J. W. Ballentine was of the opinion that the question of antenatal death by syphilis was a subject on which at the present time there was most pressing need for frank speaking and full recognition.

Dr. F. W. Mott, pathologist to the London County asylums, indicated the

preventive measures which could be undertaken by the authorities. The disease, he said, is preventable, then why not prevented. First and foremost do not cover up the evil by a false prudery. Let it be widely known. Educate the public conscience to the necessity of seriously dealing with the question from a preventive as well as a curative point of view.

Industrial Hygiene.

May I still anticipate adding to the scope and burden of the profession in this province by asking for a more thorough consideration of the subject "Industrial hygiene" than as yet has claimed its attention. While there is not so much urgency to educate the people in the principles of industrial hygiene in Nova Scotia as in countries of large manufactures, yet I think I will be supported by the profession when I say that even in Nova Scotia the knowledge that makes plain and evident to the professional man that long hours of work in workshop or factory causing bodily fatigue, and the inhalation of dust and poisonous gases are strong factors in the physical degeneration of those who are subject to them. Our attention has from time to time been drawn to the United States in connection by the effort being made there in the promotion of industrial hygiene. While there is not as much need or so large a field in Nova Scotia as in the United States and European countries for the exploitation of the principles of this branch of hygiene, yet the same effect is produced in the body of the over tired and strained worker in this country as in countries where so many are employed. We recognize the fact that overstrain, exhaustion or fatigue, constantly repeated and endured, interfere with metabolism and nutrition, rendering the system prone to any disease it cannot resist. The great opponents to industrial hygiene in the United States have been and still are the legislature lobbyists; the Cotton lobby, which throws its influence against the workers in the cotton states, the glass lobby in the glass states, the Laundrymen's Association wherever legislation for laundry work is proposed. The Retail Dealers' Association against any relief for shop girls. Such associations of employers are found officially in the field in every State Legislature, whose sole aim is to frustrate any endeavor to shorten the hours of the laborers, or block innovations that would lessen the profits accruing to the employers. This story I heard told and retold by speakers at the International Congress of School Hygiene held at Buffalo August, 1913. In the past we have not had to contend with influences which dominate legislation against the working man and woman in this country. The time is coming and may be near at hand, when we will have the same influence to contend with, while, however, the hours of labor may be curtailed or regulated by legislation, better conditions within the home, better sanitation, nutrition and hygiene, can only come by a slow process which will seriously take into consideration the men and women who are often taxed by their employers beyond the power of resistance. Among these are the telephone girls at the switchboard, those in the factories of our larger towns and cities who are calling to the medical profession to instruct the people in the principles of hygiene, which prevent exhaustion and fatigue due to excesses which debilitate and impair, so often beyond repair. We have all been up against it in our practice when we have been face to face with the conditions, that debar the tired and exhausted worker from the rest which he or she requires for recuperation. Nothing in the pharmacopeia or the realm of medicine can cure the disorder which develops under conditions which do not allow time for tissue repair.

Conservation of the Forest.

Again I crave the indulgence of the conference with a brief consideration of another problem confronting the medical profession and which has much to do with the public health, but which has not occupied the place in the profession its importance demands, viz., the conservation and perpetuation of the forest, not from its monetary value, not from the lumberman's viewpoint or because of the great industries which spring from a well protected water supply, which latter is preserved by vast areas of well protected forests, but from a hygienic and sanitary standpoint. Experts on conservation tell us that one of the country's greatest assets is the con-

servation of her water power, and this power cannot be preserved unless the forests are protected and perpetuated. The physician and sanitarian will also say that to secure a pure and unadulterated water supply for the household is the practice of preventive medicine.

When the people in the rural districts have grasped the fact, that the forest is the main source of the water supply, that the forest preserves and stores up water by creating a forest floor, causing a constant and steady percolation, the intertwining roots of the trees carrying water into the ground, storing it into springs in its purity, making this indispensable sustainer of life available for man's purposes and needs, they must admit and acknowledge the necessity of protecting and preserving the forest for the conservation and perpetuation of the domestic water supply. Surface drainage into springs, brooks and rivers, where the supply is used for domestic purposes, we know to be objectionable, because of soil particles contaminating the water. The domestic water supply from the forest is a guarantee of immunity from disease germs. It is claimed by those who know, that in the dense forest where certain chemical changes go on because of the decaying humus, that disease germs are not found. It was not long ago that the people, and I may add the physician, supposed that malaria and typhoid fever had their habitat in the forest, but now we know that their lurking place is in the stagnant pool and directly carried by the mosquito. There are, however, water borne disease germs that are carried by a polluted water supply. This supply comes from polluted rivers, springs and wells, which have been contaminated by sewers and surface drainage. All here are sufficiently acquainted with the dire results of river pollution in the St. Lawrence, the Ottawa, and the streams contributing their crop of typhoid more or less every year until health experts in some of Canada's largest cities have been tried to the utmost to know how to control it. Fifty years ago typhoid fever prevailed in the rural districts in this province to an alarming extent, since then in scores of towns, cities, villages and hamlets the water has been brought from the forest to the household, with the result that typhoid fever has decreased in these districts 90 per cent. The time has gone by when the people believed that an epidemic of disease was the "will of Providence" and they were powerless to prevent it. These unsanitary conditions and a polluted water supply were allowed to exist without any law upon the statutes to control and prevent them, but thanks to the discovery of the germs of infectious and contagious diseases, their habitat, how borne and propogated, ideas have changed. Scientific students place disease where it belongs, to the failure to observe the laws of health. One of the most important agencies governing the laws of health is a pure water supply and an unadulterated water supply can only come from the storage caused by the influence of the forest.

Tuberculosis.

For the past 25 years I have seldom written or read a paper for a medical convention in which there was not some reference to the portentous subject tuberculosis, and believing that the only way to help on in the campaign against the disease is to keep continually at it, may I therefore allude to the Bill now before the country for providing municipal sanatoria for the advanced cases of tuberculosis. The bill, as we all know, had its origin at the annual meeting of the Nova Scotia Medical Society of 1912. The bill passed the House in 1913. Subsequently, an effort was made by the Provincial Health Officer to bring the matter before the people by holding meetings and approaching the municipal councils, urging the people and councils of the necessity of taking action for the establishment of sanatoria as the law provides, but I do not think that the bill met with the approval and enthusiasm it deserved. The war breaking out in 1914 doubtless had some effect in checking the movement. The war, however, I believe was not the sole cause. In Kings County the bill did not have the support it should have received. In the County of Kings a circular was distributed among members of the profession which reads as follows. (I think that you will agree with me that there is in the tone of the circular an inflection of opposition to the movement for providing for the advanced cases of tuberculosis). The first question in the circular reads as follows: "From your experience with cases of advanced tuberculosis do you

think that many persons suffering from the disease in an advanced stage would be content to be cared for at such a home? Second: Do you not as a fact find that in all cases of tuberculosis the patients are hopeful of recovery and would hesitate to avail themselves voluntarily of such a home and object strongly to being compelled to enter the same unless assured that it offered a possible chance of cure the same as at the provincial sanatorium? Third: How many advanced cases of tuberculosis have you had in the municipality during the last year among your clientele? How many have you at the present time? Fourth: How many cases of incipient tuberculosis have you at the present time? Fifth: Have you any suggestions to make in regard to the advisability of establishing such an institution? Can you suggest any alternative for the care of patients suffering from the disease in its advanced stages, taking into account the cost of the proposed system?"

Question 1, "Would he be content to be cared for at such a home?" What under the sun has that to do with it, whether he would be content or not? The question is is tuberculosis an infectious disease? Is it year by year, in the Province of Nova Scotia, attacking one out of three and killing one out of seven? Is not the preponderance of the infection in the homes of the poor, where they have not proper food or proper sanitary conditions, huddled together in the cold season without sunlight or fresh air, nursing, keeping alive and developing the breeding places? Who should have the say of the removal of these cases, the patient or the people, or those who have the care of them, or the community in which they live and breed the pestilence? If a leper makes his appearance or smallpox breaks out, or diphtheria, who has the right to say how the community shall be guarded against the infection? Must we ask if they are content to stay at home, or would it suit them better to be quarantined or isolated in a hospital? We do not ask. We just quarantine or isolate them where they will not be a menace to the community. And the great end in view of those who were instrumental in giving to the Province of Nova Scotia Legislation to provide sanatoria for the advanced cases of tuberculosis was to get at the breeding places, to care for those who would not or could not care for themselves and isolate them where they would have more comfort than in their own miserable homes, avoiding the possibility of infection and reinfection.

2. Do you not as a fact find that all cases of advanced tuberculosis are hopeful of recovery and would hesitate to avail themselves voluntarily of such a home and object strongly to being compelled to enter the same?

That there is a tendency to hopefulness and buoyancy in many tuberculosis cases is true, but it is also true that with the intelligent person whose case has been diagnosed and to whom the physician has frankly stated the conditions of the case and the result to be expected therefrom, that the patient will not be deceived by the temporary hopefulness, but be governed by the advice of the physician. In consumptive cases where there is hopefulness there are also corresponding spells of depression, for the hopefulness is not constant but flitting, and in this day of widespread knowledge of the nature and treatment of the disease, its treatment being a constant fight for resistance against the germ causing it, the patient's intelligence will be governed by those who know whereof they speak and take advantage of the means the most conducive and favorable to their condition by seizing the opportunity of accepting an asylum where they will have a better chance of fighting the foe and building up a resistance to it than they could hope to have in their own home. Not only that, but the patient's removal to a sanatorium takes from the home the main danger of infection, for it is the advanced case of tuberculosis that is increasingly sowing the seeds of the disease, and by removing such a case from the home, the risk of infection is naturally reduced. "Unless it offered a possibility of cure same as at Provincial Sanatorium." Here is the crux of the whole question. The Provincial Sanatorium ostensibly does not receive the advanced cases of tuberculosis. The sanatoria provided for in the bill are designed for the advanced cases, not the incipient. The Provincial Sanatorium will look after the incipient cases and the management of that institution, in the event of the operation of sanatoria for the advanced cases would not be harrassed in the future

by the continual applications for the admission of advanced cases as he had been in the past. My experience in treating tuberculosis in a sanatorium is that the majority who applied there were in the advanced stages of the disease. The Provincial Sanatorium doubtless has taken in many cases beyond the incipient stage, many of the moderately advanced. The moderately advanced could be well provided for in the municipal sanatoria and the Provincial Sanatorium, then confining itself to the incipient cases, would make even a better showing than when compelled to receive the advanced or moderately advanced cases, and this showing would always invite to the open doors of the Provincial Sanatorium the early cases, thus fulfilling the purpose and accomplishing the object for which the institution was designed. When the people, when the municipalities, realize that to get at the breeding places of the disease, to clean out, root out and destroy them, is the only basis of success in getting rid of it, a rapid and far-reaching influence will go forth to accomplish this much needed reform. The act which we now have upon the statutes to divide the province into five districts for the purpose of erecting sanatoria for the reception and treatment of the advanced cases of consumption gives us the opportunity to receive just what we need to bring about this desired result.

COMMUNITY HYGIENE

By DR. JOHN K. MACLEOD

City Medical Officer, Sydney, N.S.—Conference of Medical Officers in Nova Scotia, 1915

I AM afraid my paper will not contain anything very original, but if it gives rise to a discussion which proves interesting and instructive, I will feel satisfied that the time spent in its preparation has not been in vain.

The subject, "Community Hygiene," which our esteemed president requested me to take, is a very broad one and covers a great deal of ground; however, I take it that what is wanted is to bring out the individual responsibility of the citizen irrespective of city or town ordinances.

At the very outset let me say that I believe the citizen should be compelled to do much that is done for him by the state, and when I make this statement I am quite aware it may meet with much opposition. For instance, when a family in comfortable circumstances is unfortunate enough to contract infectious disease, that family should be obliged to bear all expenses incident thereto, including fumigation and disinfection. Especially is this true in smallpox, which is a preventable disease and becomes prevalent through non-vaccination. When typhoid fever breaks out through dirty yards and filthy surroundings and well water used in defiance of health ordinances, all expenses should be borne by the family afflicted. The individual in many cases expects, and in fact demands, of the municipality many privileges to which he is not entitled.

It is the simple duty of every citizen to respect the health ordinances as adopted by the state. There is much more, however, that the citizen should be prepared to do which is not laid down in our laws. He should do his utmost to improve the health of his family, of the city in which he lives and keep his premises in good condition and encourage others in doing the same.

How Can This Be Done?

1st. The responsibility of the citizen to his immediate family.

2nd. The responsibility of the citizen to the city or town in which he lives.

Under the first heading it may be stated that the citizen should see that his children grow up strong and healthy, for upon them depends the success, welfare and future prosperity of our country. No better example of this could be found than in the present war: Germany from an educational, commercial, scientific and physical standpoint reached almost the highest point of efficiency. Her scientific and educational institutions were presided over by master minds; they were visited by students from all parts in search of knowledge. Commercially, she made tremendous strides, and from a military standpoint, while we detest her methods and her objects, we must admire her strength. But in all her greatness, she lacked the essentials of truth, righteousness and justice, and this, notwithstanding her preparedness for war, will eventually bring about her downfall, for truth and righteousness must prevail. In these qualities lie the strength of Britain and her loyal colonies. The higher then our ideals and the nearer we reach them the better our children will grow and develop. The young must therefore be cared for from the day of their birth, and indeed before that period, until they reach manhood.

A child to grow normally requires abundance of fresh air and light as well as pure food. Houses should therefore be constructed with a view to supplying the greatest quantity of fresh air and light to their inmates, and there should be land sufficient to allow air and sunlight to enter freely every window.

Mothers' milk is the food "par excellence" for babies, and it is the bounden duty of every mother to nurse her own child, no matter how pressing her social or other duties may be. If cows' milk is used it is incumbent on the mother to re-

ceive the milk direct from the milkman and at once place it on ice or in some cool place until needed for use. If this is done much infantile disease is prevented and many lives saved. How often do we hear of the poor milkmen being blamed for impure milk when often and often it is contaminated after it reaches the purchaser's home.

In addition to what has been stated, I have only to mention the terrible responsibility resting on every citizen of removing all inside and outside matter in which flies breed and feed, the destruction of the fly itself, the use of screen windows and doors, the care of the teeth of children and the removal of tonsils and adenoids, where this is needed. If this is done the child has a fair chance of growing and developing into a strong healthy boy or girl, and later taking his or her place in the development of the country.

I have only briefly referred to house planning, pointing out the importance of securing fresh air and light. While the plans of houses, both as regards interior and exterior, are as numerous almost as the stars in the heavens and each plan has something to recommend it, we are interested in not so much the appearance and beauty of the house, as the healthfulness of it, that is, the amount of fresh air and light it furnishes its inmates, and the internal sanitary conveniences. In order to have both light and fresh air in abundance, each house should have its own city lot at least. I am firmly convinced that tenements as we see them in cities should not be allowed to exist, and by their removal slums will be avoided and sickness and death, especially among children, very much decreased.

The subject of city and town planning has received very much consideration of late years. The idea that cities and towns should grow along symmetrical lines is spreading rapidly. Commissions have been appointed in many of the large cities and have done splendid work. Toronto, through some of its public-spirited citizens, formed a commission which floated loans, built sanitary and healthy homes, rent them at a sum sufficient to cover all expenses of purchasing land, building houses, and perhaps a small profit for a reserve fund. The demand for these houses is enormous. It is a well-recognized fact that the more beautiful and healthy a locality is, the more valuable property in that neighborhood becomes. Business men and real estate dealers know this, and in dividing their property for sale lay it out very often with modern conveniences installed, as well as with small parks or air spaces as an inducement to purchasers. The importance of town planning may be somewhat understood when I say that, perhaps, the meetings dealing with this subject at the Imperial Health Conference in London, which I was privileged to attend, were the most interesting and largely attended. City planning means the remodelling of existing cities, and town planning the laying out of cities for future growth. Town planning "seeks to prevent rather than cure." That is, it plans to take certain areas and lay them out along symmetrical lines and put them in a sanitary and healthy condition. After all, town planning is a sanitary measure. There is hardly a small village or town, not to mention cities, in Nova Scotia, beautiful and healthy as they are, that would not have been far in advance, from an aesthetic and health standpoint, had this town planning scheme been in vogue before they were founded. I have not time to more than mention the importance of parks, large and small, and the beautifying of existing streets with trees and flowers which add so much to the attractiveness of a city.

In conclusion permit me to say that the time has gone by when the health officer is simply a recording machine for infectious disease. His duties should go much further than quarantining, fumigating and isolating cases of disease. The education of the public should be a large part of his work, and in this work the citizen can be of much service by omitting the criticism which is so often heaped on the health officer, and instead giving him sympathy, encouragement, every co-operation and proper remuneration for his work.

THE MENACE OF INHERITED DEFECTS*

By GEORGE B. L. ARNER, P.H.D.

Statician, Ohio State Board of Health

THE right of every child to be well born, the right to enter upon the struggle of life without any handicap of inherited defect, should be one of the ideals of every public health worker. It is only too apparent that the attainment of this ideal will be extremely difficult if not impossible, but it is certainly possible to reduce greatly the numbers of those who are from birth either abnormal or subnormal. The population of the United States and the world is already great enough. Additional numbers are unnecessary. Quality and quantity is what the world should demand of the coming generation.

The studies of the biologists within the past half century have given us the basis for much effective work along these lines. The work to be done must be largely educational, as nothing can be accomplished until a certain amount of favorable public sentiment has been created. When the people come to a realization of the fearful amount of suffering and expense which results from the breeding of the unfit, the battle will be half won, for an aroused public sentiment will operate directly to prevent unfit matings, and will also force the passage of restrictive laws and will make the enforcement of these laws possible.

The inheritable defects are both of mind and body. Mental defects are of course the more serious, and individuals who are decidedly neurotic should never under any circumstances be allowed to reproduce. Feeble-mindedness in all degrees, insanity, epilepsy, chorea and other neuroses have been found to appear again and again in certain families, and there seems to be an interrelation among these diseases of the nervous system which may result in the appearance of any one among the offspring of neurotic parents. Conversely it is very rare that a marked neurosis, that is not the result of violence, appears in an individual who has no family history of neurosis. Such physical defects as blindness, deafness and deformed limbs should not be passed on to the coming generation, but such defects should not in every case operate as a barrier to marriage, as they may be bred out of the family strain.

Very few if any individuals are absolutely free from inheritable defect or the tendency to reproduce a defect. Some physical imperfections are not particularly serious, but every individual should familiarize himself with his own family history and with that of his intended mate. If inheritable defects are found which appear in both families, the probability of this defect reappearing in the offspring of the contemplated marriage would be great. If the defect appears in only one of the families, the probabilities are that it will not reappear in the offspring, because fortunately defects are usually recessive characters which will breed out unless the mating is with an individual having the same recessive character.

It is here that the danger lies in the marriage of blood relatives. Two members of the same family are likely to have the same biological characters and a marriage between two members of the same family will accentuate any defects which may have been present in any of the common ancestors. For example a deaf man might marry a hearing woman and all their children and grandchildren would probably hear. But if two of these grandchildren should intermarry the deafness of the ancestor would be very likely to reappear in the children of this marriage. If two cousins come from a family which has manifested no mental or physical defect for four or five generations there may be no bad result of a marriage between them. In fact many marriages of first cousins have apparently accentuated good qualities, and produced exceptionally strong and brilliant offspring. But since so few people know their family history further back than their grandparents there are often defects present in the strain of which the present generation is entirely ignorant, and

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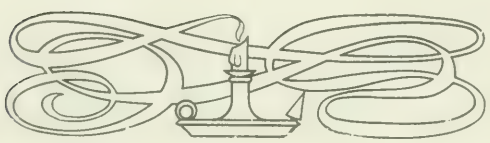
these defects may crop out as a result of a marriage within the family line.

Contrary to the general impression, there is no evidence that blood relationship in the parents in itself is directly harmful to the offspring. In many countries, particularly in Egypt and Peru, marriages of brothers and sisters have been common and such marriages have produced healthy and normal children. In modern civilized countries, however, incest is a crime, and only persons of criminal tendencies or of low intelligence violate the moral law in this respect. Since normal and intelligent children cannot be expected from criminal and weak minded parents the fact that idiots and monsters have been born as a result of incestuous connections may have nothing to do with the fact of blood relationship. There is a strong popular prejudice in many quarters against the marriages of first cousins, and sixteen States, including Ohio, prohibit such marriages by law. Careful biological and statistical studies, however, have shown that there is no scientific basis for any prejudice against marriages between cousins of normal and healthy ancestry.

The important thing is then to popularize the results of studies into the laws of heredity and to impress upon the people the fact that practically all mental and many physical defects are transmitted from parents to children often in an aggravated form. Mental defectives in particular are apparently increasing more rapidly than the general population. Under the conditions of civilized life these defectives are very properly cared for and kept alive at the expense of the community.

When these unfortunates are confined in properly managed institutions there is little danger that reproduction will take place. The greatest danger lies in the victims of the lighter forms of neurosis who are either wholly or partially self-supporting, and who are given their full liberty. Our ideals of personal liberty are difficult to reconcile with the imposition of restrictions on such persons, but it must eventually be recognized that social self-defense demands that the privilege of reproduction shall be granted only to those whose children are likely to be of real value to society. The nation would be stronger with half the present birth rate if the better half of the children now born could be selected. It is only practicable, however, to restrict the sexual freedom of those who in person or in ancestry are manifestly unfit for the privilege of parenthood. This must be done or the beginnings of social degeneration which are already recognized will continue to develop until the whole structure of modern civilization will be menaced.

Civilizations have decayed and fallen in the past, and our civilization will also fall unless we can preserve it by the utilization of that scientific knowledge in which alone we are superior to the ancients.



THE LIFE OF OUR YOUNG NATION

By SIR JAMES GRANT,

F.R.C.P., London; K.C.M.G., Ottawa

THE conditions of life at the present day call upon each and every individual to enquire carefully into the laws of health, in order to know how life can be protected, and thus prolonged into a good old age.

Our ancestors were long lived, for the reason that they lived more in the country, in free and pure air, in the midst largely of agricultural operations. To-day we cannot fail to note the intensity of life in city surroundings, shops, factories, underground sweating establishments, confined and sedentary, all of which are a tax on physical and mental energy. The great manufacturing centres, such as Manchester, Liverpool, London, Sheffield, as well as the thickly populated outskirts of New York and Chicago, demonstrate a well-defined want of vitality, in the pale faces, spare frames, indicative of the varied tests of strength and energy to which such classes have been subjected. A great deal of such conditions is the outcome of causes which might be obviated by even a moderate knowledge of the laws of health. The hygienic laws of Moses exercised a powerful influence on the masses. The Egyptians and the Greeks made physical as well as mental education a science, and in fact, a source of careful study.

Cleanliness is next to godliness, and in keeping with the laws of advanced sanitary science. Hence, the great importance of the closest possible attention, not only to ourselves, but as well to our homes, our clothing, the purity of the water we drink, and the air we breathe. It may be said of many an invalid that ease was the chief disease. Health is a quality of body difficult to define. As Premier Balfour stated (Presidential Address, British Association, August, 1914):

"It is to be remembered that the physical constitution of a nation, and its power to become and to remain great, depend not upon its ethnological origin, but upon the physical and climatic conditions under which its individuals live, and the moral and mental aspirations by whch they are led."

My present object is to point out how individual health may be secured, and how a reasonable measure of health may be attained in the life of the most ordinary individual, inasmuch as the number of years is not as important as the physiological age of the person. The epochs of sanitation in the past and present world's history are well defined. The Hebraic Epoch of personal sanitation, according to Levitical laws, and the laws of Moses, for the guidance of daily life. Second, the "Roman Epoch," municipal sanitation, owing to which the great water supply of Rome was developed and carried successfully into operation. Next, in succession, the era of international sanitation, as worked out in Havana, by military, medical and sanitary officers, of the American Republic, transforming that formerly pest-stricken city to a position of health, comfort and happiness.

Within the past twenty-five years, all along the line, a great advance has taken place in sanitary science as taught in our colleges and schools, guarding, guiding, and protecting the lives of our people, by advocating the gospel of preventive medicine. The maintenance of the health of the individual is the chief requirement of the healthy growth of the State. To-day, in each of our Provinces in Canada, the Boards of Health are accomplishing a good work, the practical results show quite a marked change in our general death rate.

During the past half century preventive medicine has accomplished much to alleviate suffering and prolong life. In the 17th and 18th centuries the death rate of the civilized world ranged from 50 to 80 per 1,000. To-day in London, Berlin and New York it averages between 17 and 19 per 1,000, chiefly due to protection from infectious diseases during the first five years of life. The expectation of life at birth in New York in 1886, according to Dr. Biggs, Health Department, "was only a little

more than 25 years, when in 1903, according to the death rate of that year, it almost doubled, and equalled about forty-two years, the result of hygiene measures and searching investigation in laboratories. Pasteur and Koch applied the light of science to preventive medicine and counteracted the onset of disease by sanitary regulations, suppressing the conditions favorable to the propagation of pathogenic bacteria, and protozoa, and the use of specific vaccines, serums, and drugs, truly prophylactic in character.

Woman's work in Sanitation is a remarkable evidence of her efforts for good. The Women's Health Protective Association, of New York, is an undoubted advance in the scientific principles of health. Bakers' shops, slaughter-houses, play grounds, public parks, school hygiene, all in turn receive careful inspection. The children of the nation are the physical capital of the future, and cannot be too safely guarded.

The medical inspection of schools, according to Dr. Kerr, of London, is well received in England, by the Medical Department of the Educational Committee of the London County Council. The school doctor has been slowly, but surely, taking root on the continent for many years. Within five years, Germany now has no less than 676 school doctors, appointed in 234 towns and districts, and the regulations for medical examination of school children, approved by the Minister of Education. In Switzerland, Austria, and many European countries, like energetic action has been taken. The London School Board appointed a medical officer in 1891, and the Bradford School Board in 1893, whose chief duty is regular school visitation; and the other large towns are now moving in the same direction. Recently, the Inter-Departmental Committee of England, on the Model Course of Physical Exercise, reports that, no form of educational organization can be considered to be complete, which does not make provision for the systematic reference of questions of school hygiene, and the special treatment of individual scholars, to medical experts.

The systematic medical examination of school children in Canada has been under consideration during the past year or two, in which, so far, there is evidence of success. In the county borough of Blackburn, England, the recent report of Dr. Alfred Greenwood, Medical Officer of Health, has attracted widespread attention. Of 328 school children examined personally, no fewer than 54 were suffering from tuberculous diseases. It is a serious state of health that out of 338 children taken at random for examination, 34 should have pulmonary consumption. Such statistics will doubtless prove a surprise to many. The fact that young children are generally not supposed to suffer from pulmonary tuberculosis may account for such states of the system being passed over, in a casual manner. Most important in the early discovery of lung diseases are separation from children in health; careful inspection from time to time of those who have been exposed to the disease, and most thorough enquiry into the standard of living, in the residences of those diagnosed as consumptives. In Boston to-day a medical man is employed in educational institutions, where he performs the duties of medical inspector for an hour each morning. In case of public health, the interdependence of sanitary and medical sciences, and engineering, cannot afford to be separated, inasmuch as they are a powerful help to each other, and an undoubted evidence of progressive development in the line of hygienic principles, almost universally accepted in civilized centres. Plumbers should be specially educated, and licensed, as the escape of sewer gas has developed scarlet fever, diphtheria, puerperal fever, blood poisoning, sore throat and even pneumonia.

Pure air and sunlight are first-class disinfectants, and as a vital necessity in every household, their importance cannot be overestimated. Success in life depends more on ourselves than our circumstances. "More men have ruined themselves than have ever been destroyed by others; more houses and cities have perished at the hands of man than storms or earthquakes have ever destroyed."

According to Lord Avebury, the first ingredient of a good talk is truth, the next good sense, the third good-humor, and the fourth wit, and the first three are in the power of anyone. In ordinary conversation, what is more common than the state of the weather? Let us hope that the next most interesting subject will be public health. How many have fallen victims to

a life of indulgence, and complain of the world, when actually they have only themselves to thank for it. "I'm young," said Dr. Musset, "I have passed but half of the road of life, and already weary, I turn and look back. What a grand gratification it must be to look back with thankfulness, and forward with hope."

As Tennyson has charmingly expresesd it:

" 'Tis life, whereof, our nerves are scant,
'Tis life, not death, for which we pant;
More life, and fuller, that I want."

Food.—In the ordinary acceptation of the term, to even talk of any person dieting, leads to the idea of a defect in the system, which requires remedying. By a dietary, we mean that amount of food which will keep an ordinary individual in good, robust health. This subject will stand the most careful enquiry, and amply repay the reward of labor, in that direction. Mental laziness is really not uncommon with the masses, who in a great measure, accept facts without personal enquiry, and in no line is such more evident than in the food supply of the system, in fact, the science of nutrition is still in its infancy, and why should such be the case, when "food is that which builds up the body, and furnishes energy for its activities."

Food supply is the controlling factor in life, animal and vegetable alike. In the list of food materials, oatmeal is not surpassed, as a producer of physical power. It, in fact, produces more muscle, and better muscle, than beef steak.

"Food is the only source of human power, to work, or to think," and extends to all alike, young and old and really the chief source of danger to the system is more in quantity than quality, as it is now a well known fact, that more people die from over eating, than from under eating, or alcohol.

The prospect of long life depends greatly on the manner in which life has been cared for and protected in the stage of childhood. In this stage, the very corner stones of future strength and constitutional development are placed, so as to build up and construct tissue possessing the elements of vitality. Pure milk, sterilized and pasteurized, is what the infant requires as an article of diet, and particularly mothers' milk, entirely free from disease. Society life contributes largely to the artificial plan of bringing up children, not in keeping with the laws of nature, and contrary to the very principles of common sense. Digestive power should be largely regulated by the condition of the teeth; wanting in infancy, calls for liquid diet, and in advanced age, the quantity and quality of food must be carefully guarded. Man frequently treats the stomach as if a machine, and under the impression that will power, is equal to any irregularity. Food for school children is only second in importance to that for the infant. Scrap diet, at this particular time, is really not fit, is not suitable for mental development. So also with the university student, the nutritive material should be equal to the requirements of the system. At meals, the business of life should subside for the time being, as when the digestive nervous power is off in another channel, the whole system suffers more or less, and more especially, as it is a well known physiological fact, that the brain digests more than the stomach.

Sir William McEwen (Huxley Lecture, London, October 8th, 1904) makes the following statement:

"The standing lunch, eaten against time, while the mind is fully occupied with business or professional examination—the food instead of being chewed and mixed with saliva, being simply washed down as a bolus with some fluid, is one of the best ways of not only producing indigestion, but of ultimately causing caecal and appendicular mischief. Man has neither a crop like a bird, nor a caesum like a horse, and, therefore, he has no provision for bolted food. One has heard of children being forced to take food which they dislike, because 'it was good for them.' The digestive juices will not flow under these circumstances. The brain of children is so often burdened with 'tasks' committed to memory and engrossed with educational enigmas, that there is no time for digestion. Mastication is not taught in schools, digestion has no place in national education, and there are no certificates given for sound digestion, but we appoint Royal Com-

missions to inquire into the causes of the physical deterioration of the race."

Food adulteration should be guarded against, and food preservatives, such as salicylic acid and boracic acid, harmful to the very structure of the stomach. Adulterated foods, are to-day a subject of careful analysis, by the proper authorities, a right move, in this age of scientific progress.

I recently learned from Dr. Rutherford, Veterinary Director-General, Ottawa, that as to meat inspection no less than 67 veterinary inspectors were at present engaged in that important duty, and 12 lay food inspectors, also 147 veterinary inspectors of the health of animals.

The evils of high living are decidedly bad and certain to lead to serious results in time. There is much to be hoped for in this enlightened and progressive age. Its influence on a requisite simpler life is slow in coming. Punch once called attention to the "Starving Doctor," who at present time would soon come to grief for the want of patronage. The evils of high living are decidedly bad for the youth, as well as the adults. Debility from want is greatly different from debility from actual failure of the digestive power, the result of overwork, in the effort to get rid of the excessive amount of food, an over plus at each meal.

A Dumfermline doctor stated, whose practice was chiefly among navies, that they were usually worn out at 40 years of age, and at 45 scarcely known. Had they reduced their food considerably, such results would not have taken place, by a simpler and restricted diet. It is well known that the digestive organs get weak with the rest of the body, and that advanced age entails less demand for food, and at this stage in life's drama, artificial teeth, according to Sir Henry Thompson, frequently dig the owner's grave. It is by fair play from the commencement of an ordinary life that man is likely to reach a good old age.

According to St. Paul, "They that strive for the mastery are temperate in all things."

It is a well known fact that high living is fatal to good shooting. When one is engaged in any mental strain, less food should be taken. Three celebrated men. Sir Isaac Newton, Napoleon and the Duke of Wellington, when engaged in some great problem in science, or war, took little food until the strain was over. General Crockett, who was with Wellington in the Peninsula, stated that when a long menu was presented, he would run his finger down to the pudding, his chief diet for the occasion.

Sir Erskin May, once a great worker in the British House of Commons, attributed his good health to the fact that he took a chop in the middle of the day and only a cup of tea at night. Lord Palmerston followed the same plan, and like many other great men, could enjoy a full dinner on particular occasions. The way of life, yes, long life, is narrow, the other broad, few walk in the one and many in the other, the attractive, the telling path of a simpler life.

"A cultivated taste in food is as much needed, or even more than a cultivated taste in amount. Just as in furnishing a house, it is not the money spent, but the good taste in the arrangement of the whole, as well as in the choice of the individual articles, so in food for the table, it is not the money spent, but the sort of material purchased, and the way it is treated, after purchased, which determines the effectiveness of the expenditure." (Cost of Food by Miss Richards.)

Many will say that they would rather live a shorter time, and enjoy the years they have. But such enjoyment is of a varied character, dignified by stiff joints, irritable mind, frequent mistakes in family life and business, followed by nervous depression and mental break downs, as the result of want of care and prudence in the fundamental laws of life.

"If you wish to be well," said Abernethy, "you must live on six pence a day, and earn it yourself."

Some years ago, when on a visit to Lake Winnipiseogee, New Hampshire, I had the pleasure of an interview with the poet Whittier, who was rusticating at the charming spot, where originated a considerable share of that gifted poetic imagination which has given him a world wide reputa-

tion. He remarked he was not married, began life as a shoemaker, and afterwards turned his attention to the more congenial line of literature. He never tasted alcohol. He felt almost quite alone, as all his old friends and associates were gone, except two, Dr. Oliver Wendell Holmes and Lowell. Since that date, all three have passed away, and are now entombed amidst the illustrious dead of the great Republic. Whittier's life history is an object lesson, temperate and simple, all the way through and attained a good old age.

At the present time there are few influences of such wide and far reaching effect as arise in many directions, from the use and abuse of alcohol. Alcohol and crime, alcohol and lunacy, alcohol and poverty have a remarkable affinity. Fully twenty per cent. of accidental deaths are due to alcohol.

In 1886, Dr. Mitchell estimated that the drink habit in America reached the enormously high figure of $1,000,000,000 = £200,000,000. In that particular, the British Isles are not far behind. The total expenditure in 1908 was £161,060,462. Today it is most gratifying to observe the vast change for the better, the result of your enlightened and far seeing people, who are doing their utmost to suppress this traffic in alcoholic liquors, in this rich and prosperous country. The drinking habit is wide spread in its character, and few who follow persistently in that path will attain old age. I feel confident the time is coming when common sense people will assert themselves, as to the solemn duty to be performed in this trying direction. Intemperate agitation cannot accomplish practical results. The brick and mortar of the human frame are not held together by alcohol. It quickly and gradually undermines the vital forces, and establishes foundations of disease of an undoubted character. The general opinion at the present of close observers is that alcohol as a beverage is decidedly on the decline and fashion is becoming a powerful factor in that common sense and life prolonging direction. Public gatherings are now celebrated, more and more, with the use of tea, coffee and mild beverages. What a subject of congratulation, such changes in the drink habit, are taking place. What can possibly be more desirable when we consider the remarkable statement of Dr. Norman Kerr, of England, that of the 260,000 deaths occurring amongst children below the age of five years, 65,000 are directly or indirectly due to intemperance and alcohol is the undoubted sinner.

According to Sir Henry Thompson (a once acute observer in this line of action) its evil effects are chiefly on cellular structure, it paralyses the activity of the cells; prevents their growth, retards their renewal, and in fact hardens the protoplasm. Alcoholic liquors should not be given to children. Their nervous system is more sensitive, and their bodies contain a large proportion of young, growing formative cells which will be destroyed by alcohol. It is not only injurious to the young cells of youth, but as well destroys gradually the new and young cells of maturer age, and thus degeneration and decay of bodily tissue is brought about. The continued use of alcohol is attended by the same physiological results and permanent structural injury is certain to follow. The moderate use, or even the reverse, will in time be followed by damage to the system of a more or less serious character.

Alcohol in the stomach becomes a regular "Dog in the Manger," not capable of building up the body, and prevents the solution of those substances intended to nourish, build up and repair the wear and tear of the system. By great energy and perseverance the slave traffic was conquered and let us fervently trust the day will arrive when you will conquer the Liquor Traffic.

Alcoholic beverages do not aid digestion, but retard and actually prevent the solution of food, for the time being. True, liquids are agreeable to the human system and, in fact, to most people alike. They exhilarate, they remove depression, they lighten pain, they make glad the heart, and foster conviviality and good fellowship. All such, however, is temporary in character, and certain to produce a telling result on the system. Alcoholic drinkers are by far the most subject to epidemic diseases, and with a lessened prospect of recovery. The arctic explorers Rae, Kane and Nansen, required no alcohol for their crews, all of whom returned enjoying the best of health.

As a medicine, in emergency, its therapeutic value is of importance. The liver, brain and kidneys are said to receive the largest percentage, and consequently the most likely to develop disease as the result of excessive use. Thus, at a glance, we see how life may be shortened. On the other hand, it is now an established fact that those who never use alcohol live the longest.

Dr. Christopher William Hufeland, of Jena, in 1797, published an admirable work, his chief object being, on systematic grounds, to establish the art of prolonging life. He condemned strongly the use of alcohol and commended and recommended total abstinence from intoxicating drinks as an undoubted means of lengthening life. Fortunately, there is to-day springing up amongst the members of the medical profession a truly wise system of prescribing, not only abstinence in regard to alcoholic drinks, but abstinence also in diet, the very foundation of a simpler life. In fact, the advanced scientific physician endeavors to persuade sufferers to gradually let themselves down to a natural proportion of food and drinks, certain to be attended by the happiest results when faithfully followed.

The work that can be done during entire abstinence is superior in every respect, in amount, in readiness of effort, in quality, in mental ease and happiness to that which surrounds the indulgence in alcohol, which neither gives strength, nor maintains it. It lessens strength of will and determination of character, both of which are required to overcome the habit, once developed.

What a sad plight to be placed in, the inability without restraint to conquer such a latent desire, certain to be followed by serious results, if persisted in, and the long continued habit of taking alcohol engenders the appetite, which, once established, actually requires more than ordinary courage and strength of will to vanquish.

To-day, woman is one of the most powerful factors at work and no longer content

> "To guide the spindle, and direct the loom."

but also to take an energetic part in counterbalancing such sad and trying influences, destructive to fame, name, reputation and honor.

"When Satan cannot go in person," says an old Jewish proverb, "'he sends wine."

> "Once the demon enters,
> Stands within the door;
> Peace and hope, and gladness
> Dwell there never more."

Shakespeare charmingly expressed condemnation of drink:

> "Oh that men should put an enemy in their mouths,
> To steal away their brains, that we
> Should with joy, pleasure, revel and applause,
> Transform ourselves into beasts."

These are the principles involved in every-day life, and too much cannot be said in correcting wrong ideas, and wrong impressions, which, when permitted to exist, cannot fail to bring about constitutional trouble, that would certainly in time shorten very considerably the expected term of life.

Fortunately, on both sides of the Atlantic, labor leaders have a direct thought for the better moral condition of the working classes. Clubs, such as the well-known Hollywood Inn, at Yonkers, N.Y., are being formed, and attended by the most practical results as far as withdrawal from alcoholic beverages are concerned, and the development of the principles of comfort and happiness in keeping with a simpler, a temperate and a longer life.

Our Governor-General, Earl Grey, took a most active part in England, with Lord Goschen and Cardinal Vaughan, in the formation of "The Public House Trust," in towns and counties, aiming at respectable places of refreshment, favoring non-intoxicants, rather than intoxicants, which has had most practical and telling results. This is a progressive move and should be given a fair trial in Canada, in preference to the introduction of sudden temperance measures.

In 1846, "The World's Temperance Convention" was held in London, supported by leaders in this great cause. More than half a century has passed since that great event and some remarkable changes for the bet-

ter have taken place. There is still room for action in this age of enlightenment and progress. From all parts, distant and near at hand, from land and sea, from river and mountain, there flows a tide of evidence against this poison of all poisons, sufficient to stir to action the deepest feelings of humanitarians to still greater activity, in promoting the very best interests of our race, by temperance in the widest acceptation of the term, a good and noble work.

In child life, the foundations for the future, as to growth, development and general strength of system are laid down. The home and the school are interdependent as to the strength of the system as well as in intellectual development. Manual training, industrial training and technical education are gradually being carried to the front, and such education certainly tends towards practical results and the attainment of a good old age.

Professor Sir Michael Foster, in his "Rede Lectures" stated, "If there be any truth in what I have laid before the Royal Society, the sound way to extend the limits of brain and muscle is by encouraging the humbler helpmates, so that their more efficient co-operation may defer the onset of weakness."

Games, like walking, promote physical development and general health, but should not become the business of life. Physical vigor and mental activity are closely allied. Lincoln, Conkling and Gladstone retained considerable physical power, rail splitting, boxing and tree felling, and so with Tennyson, Beecher and Huxley, each had his time of physical training, as well as mental culture. Muscular exercise is not really a matter of secondary consideration, but a reliable adjunct of "long life."

It is fortunate the reign of bone and muscle is not over, or the reign of brain and nerve being supplanted. A moderate degree of "mental cold storage," would at any time correct erroneous impressions in this direction. Success in science, or in the ordinary affairs of life, cannot be accomplished without the "master word—Work," and such work, energetically applied, in the lines to which I have invited your attention, would be followed by results of a telling, and most practical character, as to

> "What shall we eat, and what shall we drink, and where withal shall we be clothed."

All of which are closely associated with "The Life of our Young Nation."

In conclusion, I am pleased to state, there is no subject at present requiring closer attention on the part of public authorities, as well as of our young nation, than "The North American Conservation Conference," and the principles defined. The people on both sides of the "Boundary Line" are equally interested in natural resources, and it is gratifying to note the important place assigned to public health. The pollution, mainly by sewage, of streams, rivers and lakes, is an undoubted danger to health of man and beast. Such fertilizing elements, if turned to practical account, would save thousands of valuable lives, victims of typhoid, tuberculosis and other diseases, and reclaim vast areas of barren lands. The greatest of our national assets is the health and vigor of our people and how can such conservation be carried out more successfully than by the education of our young nation in these lines, so as in the near future to guide and direct, in every possible way, the best interests of our Dominion.

THE ERADICATION OF TUBERCULAR CATTLE FROM MILCH HERDS

By A. W. TRACY, D.V.S.,
Sherbrooke, Que.

THE production of milk from healthy cows and the delivery of the same to the consumer in a condition as nearly approaching the state of purity in which it comes from the cow, as is possible, is one of the problems that to-day confront the sanitary inspector. It is also clear that as a first step, diseased cattle, in as far as possible, be removed from the herds, and as we have abundant evidence of the transmissibility of the tubercular bacilli of the bovine to the human with grave results, it is obvious that as a primary step, cattle suffering from this disease should be removed from the herds and disposed of in such a manner as to preclude any possibility of infection from the carcases. It was with this end in view that the City of Sherbrooke, in October, 1911, enacted a by-law to the effect:

"That all cattle, from which milk is being produced for sale in the City of Sherbrooke, must be subjected to the tuberculin test and the reactors removed."

The tuberculin test was accordingly at once proceeded with and when completed for the first time (30 dairies, 650 head, 13 per cent., or 84 head), reacted. These were removed, and all cattle brought in to replace those tested.

A second test of these cattle eight months later, gave us 7 head or about 1½ per cent., of reactors.

A third test eighteen months after the first showed up 4 reactors out of 674 head of dairy cattle, or a little more than ½ of 1 per cent.

I may say in this connection that the test met with some vigorous opposition on the part of owners of these cattle. In the first place the absence of compensation for reactors was considered a serious grievance. Secondly: A demand was at once created for good milch cows which had been subjected to the tuberculin test and found healthy. In the first we consider that, to compensate a man for the removal of one or more worthless diseased cows, with which he is endangering the health of the public, is a mistake and liable to encourage careless, filthy habits, also that a man who has had his cattle tested at the expense of the municipality, has no cause to complain. In the second instance, at first the demand for tested milch cows could not be met by cattle dealers, but by the time the second test was completed, upwards of twenty-five farmers, who are engaged in the rearing of milch stock, had had their herds tested and were in a position to put a number of tuberculin-tested milch cows within reach of the dairymen of the city. I may say, in this connection that, at the present time, there are 79 of these tested herds, aggregating upwards of 1,100 head, herds from which all reactors have been removed and upon which city dairymen can obtain their supply of fresh milch cows as they require them, and the number is increasing very rapidly. Thus, the demand will invariably create a supply.

The tuberculin used in our work here was supplied by Parke, Davis & Co., and is officially listed as Bio. No. 920. Both the intradermal and the subcutaneous systems were employed, and, as far as my experience goes, I am of the opinion that the intradermal is fully as reliable as the other and much more satisfactory to work with.

The disposal of reactors, at first was the cause of considerable worry, however, some have been killed by the owners and burned or buried, but by far the majority have been killed under veterinary inspection and disposed according to Federal regulations. We have at present a very strong agitation in favor of a municipal abbatoir, and the prospects are that such an institution will soon be provided in

order to deal thoroughly and profitably with occasions such as we have experienced in the past eighteen months.

The strenuous lesson of the tuberculin tests of the past two years has been used as an object lesson for emphasizing the truths of sanitation.

Once an owner has been convinced that he has tuberculosis in his herd of cattle, that the presence of this disease is favored and the process of infection accelerated by dirt, darkness and foul air, that the absence of these conditions tend to promote health and increase the productiveness of cattle, then we can make a reasonable amount of progress toward getting the dairy stable into a condition of sanitation. As a rule it takes a stiff lesson to make an impression. That is why I am opposed to compensation, as there is a tendency to take too many chances when a man is sure that he will receive for a worthless diseased cow, two-thirds the value of a sound and healthy one.

Window lighting, equal to one-tenth the area of the stable floors, lime-washing of interiors twice yearly, cleaning and grooming of cattle, covered milking pails, buildings erected for the sole purpose of handling and storing milk and the cleaning and sterilizing of milk utensils, the removal of manure and the proper disposal of the same at a safe distance from the stable, these points are all very important and are not impossible to attain for the reason that they form an important advertisement for the producer. We also find that the score card is an important adjunct to maintaining sanitary conditions among milkmen, as it supplies a permanent record of every producer's methods and equipment from month to month.

With regard to ventilation, however, we have met with stubborn opposition where we have undertaken any very pronounced reforms over existing conditions. We have advocated the Rutherford system and it has been generally installed, but of what value is any system that is prevented by the owner from doing its work? There seems to be a deep seated prejudice among many milkmen in favor of a very high stable temperature. This high temperature cannot be attained (in the absence of artificial heating) where cattle are allowed an individual space of 500 cubic ft. each unless the ventilators are closed. I am speaking now of Canadian stables during the winter months. Once a day the stables are opened up to be cleaned, etc., the temperature drops perhaps twenty degrees, the cattle are one moment in an atmosphere of 75 degrees F., that is humid and relaxing, the next the stable temperature has dropped to zero. This sudden change cannot but have a bad general effect on a milch cow, still the owner will tell you that his cattle will give more milk under these conditions than if the stable is dry by ventilation at a temperature of say 50 degrees F.

Personally, it is my opinion that cattle will feed better, milk better and thrive better generally in a well ventilated stable temperature of 50 degrees F. than at a higher one.

ANTI-TYPHOID INOCULATION

By DR. C. W. BLISS, M.H.O., Amherst, N.S.

Conference of Medical Health Officers of Nova Scotia, 1915

N a leaflet lately issued by the Ontario Board of Health we find the following declaration: "In the South African and Spanish-American wars, the mortality from typhoid was greater than from the bullets of the enemy, as shown by the following figures:—

South African War.—Number of men engaged. 380,000; number of cases of typhoid, 57,000; number of deaths from typhoid, 8,200.

Spanish-American War.—Number of men engaged, 120,000; number of cases of typhoid, 20,730; number of deaths from typhoid, 1,580.

The most striking proof I have yet read of the utility of anti-typhoid inoculation is also set forth in the same paper, as follows: "At the mobilization of 10,759 United States troops, Jacksonville, in 1898, before the use of anti-typhoid vaccine, there occurred 2,693 cases of typhoid fever, while the number of cases in 1912 among 12,000 troops who had been inoculated, was just one case—camp conditions the same."

Nothing could be more convincing than the above statements. While I have followed for the past four or five years, the increasing use of this almost certain safeguard against typhoid, my personal experience is limited to something less than one thousand cases, soldiers, principally members of the 6th C. M. Rifles who were inoculated by me during the months of April, May and June last. The "typhoid vaccine" was supplied to the Militia Department by the Provincial Board of Health of Ontario, and furnished in two strengths. That for the first inoculation black label) contained 500 million dead typhoid bacilli, dose 1 c.c. (or 15 m.). The red label vaccine, for second inoculation, containing one billion dead bacilli (double strength of first), is given in same size dose, ten days after first inoculation.

My method of administration was as follows. I had three assistants. As the men entered the front door of the room they gave their name, name of regiment, and number of company (or letter) to assistant No. 1, who entered same in a record book ruled for this purpose; which also recorded date and number of inoculation (whether first or second), and had spaces for smallpox vaccination and remarks. I may say here that vaccination against smallpox was given in every case from ten days to two weeks after the last anti-typhoid treatment.

While men were giving this information to first assistant, they removed their coats, rolling up shirt sleeve of left arm (except in cases that were left handed, when the right arm was used). Number 2 assistant washed the back part of the arm, at about the level of insertion of deltoid, with hot sterile water and antiseptic soap (so called). Assistant No. 3 applied tincture of iodine over spot so washed, and the man then reached me. The serum was injected into the cellular tissue at spot prepared. The man left the room by a rear door to avoid confusion and loss of time.

I used a small enameledware basin of water over an alcohol lamp to sterilize the three dozen needles I began with, using a fresh needle for each man, returning them to boiling water again, but in another bowl, and dressing forceps to take needles from water.

The syringe used was of English make with glass barrel and metal plunger, with needles that pushed on, instead of screwing on, which enabled me to change needles in one-quarter the time necessary for the screw needles. I can, with method employed, easily do from 35 to 40 men per hour, if they come fast enough. From 4 to 6 or 7 o'clock p.m., I found the best time to use the treatment, as whatever constitutional effects occurred were practically over by the following morning. The men got 48 hours "off duty" from hour of inoculation.

The local effect of this treatment I found not one-quarter as pronounced, as occurs after smallpox vaccination and, though the constitutional effect, differs in a marked degree in individuals, those who felt it most, described it to me as like when they were beginning with influenza.

I most strongly urge the use of this inoculation in all public institutions and especially by nurses and those directly dealing with typhoid fever.

I may say, in conclusion, that I kept my whole outfit in a suitable tin box, fastened with strap handle and padlock, in which I also kept the record book.

MUSCOVITE AND ROMANOV TSARS

By FLORENCE WITHROW

(Continued from last month)

Poland was forced to do the same. To recover lost domain was therefore the desire of both Russia and Poland, whose kings united in a determined effort. They found a formidable foe in young Charles XII., whose Viking blood made him one of the greatest warriors of his day. After a wearing fight the Swedes were victorious and took Warsaw and Cracow; however, the tide of success turned, and by gaining control of the River Neva, Peter secured a strategic point where he began building Petrograd, 1703. Charles XII., glutted with success in Poland, pressed into Russia in spite of the rigors of winter and lack of food, but at Poltava, 1709, met absolute defeat, as a result of his mad onslaught, and thus was undone much of the work of his illustrious uncle, Gustavus Adolphus, for Sweden sank into the background while Russia rose to the fore. The traitor Cossack leader, Mazeppa, who deflected from Peter and joined Charles, expired just before being struck by the Russian hangman.

On gaining a respite from engaging with Mars, Peter turned to the Goddes of Love and took to himself a new spouse, having repudiated Eudoxia, his unfelicitous first wife. Catherine Skavronskaya was a Lithuanian peasant of humblest origin, who had been taken prisoner, and who pleased Peter by her cheery disposition. Of her exalted rank as queen and successor we shall learn presently.

In ecclesiastical and civil reforms Peter was indeed radical. He abolished the Patriarchate because it was not submissive to the sovereign, and because it humiliated the Tsar to lead the Pontiff's ass on Palm Sunday. In short, he made the Church dependent on the State, as it is today. Russian society he completely changed, basing it on European rather than on old Asiatic customs, and women were allowed to come out of their harems, where they had lived in Oriental seclusion. The courtiers adopted European dress, even to the huge perruque of Louis Quatorze, and the beard was ordered shaved by Imperial decree, but if perchance allowed to grow, a heavy tax was imposed for this capillary privilege. The ancient Russian calendar which counted from the so-called beginning of the world, was also revised.

One reform Peter the Great neglected, to his discredit, namely, the amelioration of the condition of the serf, whom Boris bound to the soil by rigid law and whom he forbade to change to another master or occupation. Serfdom had developed during 150 years until it became an aggravated form of slavery from which the shackles were not broken until 1861, when emancipation was really effected. To be sure, Peter permitted a small number of serfs to enter the army, and even allowed a few to engage in trade, but on the whole he strengthened their bondage, which accounts for Russia's awful backwardness among the peasant class.

One of Peter's greatest aims was to procure yet more territory on the Baltic for an outlet to the sea. Ivan III. and IV. had the same ambition, but they lacked the colossal determination of their great descendant, who carried to a successful issue the long trial of strength with dominant Sweden. Small wonder that the unfriendly spirit between Russians and Swedes has not yet died out, for each has been hereditary foe to the other. In 1718 Peter's old enemy, Charles XII., was killed, but the Swedish Diet continued the war for three years until finally it was glad to sue for peace, which resulted disastrously for Sweden and guaranteed to Russia many Swede provinces, including most of Finland.

Some years before Peter had begun his new capital at an immense cost of men and money, since thousands were sacrificed in the morasses, for the city was built on a million piles. Nevertheless the Tsar's invincible will accomplished the gigantic task, making as Kipling says, "the thing that couldn't, to occur," and time has proven the wisdom of his choice of site for Petrograd on the Neva, near the Baltic.

Embroilment with Turkey was Peter's next game, since he wished an outlet on the Caspian Sea, which, after hard fighting on the Volga in Astrakhan, he eventually gained.

A circumstance now occurred which is hard to explain, except by remembrance that Peter the Great was the descendant of a long line of semi-Asiatic tyrants and

that in spite of European enlightenment Slavic savagery lurked in his veins. The event was the cruel and wilful murder, by his own decree, of his only son and heir, Alexis, the child of his divorced wife, Eudoxia, under whose influence the lad imbibed reactionary principles against his father's progressive policies. This son vowed he would destroy Petrograd, and the infant navy over which Peter had drudged so hard, and that he would return the Court to Moscow and to its Oriental barbarities, also that he would restore the power of priestcraft. The irate father, learning all this, was so hotly incensed that his anger turned to murderous hate.

Perhaps no character in history is more enigmatic than this Titanic Russian, who was so strange a mixture of virtues and vices, so self-controlled yet so self-willed. He had an ideal sense of the dignity of labor which showed in his prodigious capacity for work, and in spite of traits of the Oriental despot he was no fatuous lover of ease and luxury, but was simple-living and had an unquenchable thirst for knowledge. As Augustus Caesar found Rome brick and left it marble, so this Tsar of all the Russias found its provinces Asiatic but left them European.

He extended its dominions from an obscure realm to a recognized Empire, created a navy, constructed canals, developed industries, encouraged commerce, established education, founded a common language, instituted the first Russian newspaper, built museums and libraries. Eccentric in appearance, as well as in manner, many amusing stories are told of his quaint oddities, such as his sitting in a shabby blue serge blouse smoking a huge Holland pipe and chatting with a newly-arrived Dutch skipper, or his working at a forge with grimy arms and then peddling the horseshoes he had made. On January 28, 1725, this remarkable genius died at the early age of 53, leaving no heir.

Naturally strife arose as to a successor, between the old Russian party and the Progressives. The former wished to raise the infant of Alexis to the throne, but the latter party succeeded in electing Catherine, Peter's widow, who reigned only two years (died at 39). Her abilities being mediocre the real ruler was Menshikov, the favorite and companion of the late Tsar, who in childhood sold cakes in the streets of Moscow. He lacked the guiding spirit of progress, hence only two events distinguished his administration, namely the founding of the Academy of Science and the discovery of Alaska by Behring, a Danish navigator in 1728.

Catherine chose as successor the young son of Alexis, Peter II. (1727-30), and appointed Menshikov as his guardian. This vainglorious man dominated not only the boy Tsar, to whom he betrothed his daughter, but the whole nation, and was feared more than the great Peter himself. However, his high-handed control was short-lived, for, four months later young Peter II. signed the warrant for his arrest and banishment, and only one year did he survive a weary exile amid the snows of Siberia. Strangely checkered had been his career from pastry vendor to companion of the greatest Tsar, then Regent to the youthful ruler of all the Russias. In spite of pride and rapacity, Menshikov was a great and picturesque figure and the loneliness of his end enlists sympathy (died 1729).

The following year Peter II. died of smallpox. She succession again became a national concern. There was much dispute over the daughter of Peter the Great's peasant wife and the three daughters of his elder brother Ivan, but one of the latter was chosen, Anne, widow of the Duke of Courland.

Her councillors, thinking it a good time to curtail the monarch's power, forced her to sign certain articles, but later she rescinded her contract, tearing it to pieces, and insisted on being acknowledged an absolute sovereign. Thus a second time Russia failed to procure constitutional promises from the ruler, the former time being the supposed charter forced from Michael Romanov.

Anne (1730-40) was a coarse woman with a vulgar Court and a pernicious favorite Biren, who became a villainous tyrant. The chief event of her reign was the wresting of the port of Azov from the Turks.

On Anne's death once more a dispute arose which was settled by her grand nephew, Ivan, being chosen as successor, with Biren as Regent, but the latter was shortly banished even further into Arctic snows than was Menshikov. As the infant Ivan (of Brunswick) was more German

than Russian, German ministers virtually ruled, which proved his undoing, for the Russian party raised to the throne Elizabeth, daughter of Peter the Great, by a dramatic coup. The amazon Elizabeth, supported by a strong body guard, forced the Winter Palace at dawn of day and seized the baby Ivan, his father, mother and sister in their beds, and by 7 a.m. took possession of the palace. Princess Elizabeth was forthwith proclaimed Empress, aged 32 (1741-1761). Proscriptions, confiscations and exiles speedily followed and "Bloody Bess" might well have been the title of the new Czarina. She was handsome, gorgeous in dress and depraved in manner, and preferred her irregular life to an offer of marriage with Louis XV.

The fate of the deposed royal family was pitiful in the extreme. The young father, a Duke of Brunswick, the mother and five children were banished to a fortress on the White Sea, in the Arctic Ocean, but the baby Tsar, for safe keeping, Elizabeth ordered to be confined in Schlusselburg, on the Baltic, while his German ministers were all executed or exiled, by order of the merciless Czarina.

Her reign was occupied chiefly with wars and gradually Russia acquired most of Finland. Up to this time Russia's encounters had been with Tartars, Turks, Poles and Swedes, but by joining Austria and France against Frederick the Great in the Seven Years' War, Prussia was added to the list of foes.

Elizabeth, who was piqued by slurs from the cynical Frederick, was unwilling to temporize and dispatched an army of 83,000 under her favorite, Apraskin (1758). Many reverses befell these men, nevertheless they actually entered Berlin, where they committed frightful ravage. Frederick's fortunes were then at lowest ebb, consequently he threatened suicide and wrote some bad poetry, for the loss of Pomerania nettled his pride. However, the Czarina's death caused a sudden change in Russia's foreign policy, which saved Frederick from disgrace.

Ignoble as was Elizabeth's character, glory attaches to her reign, for like her more worthy namesake, Elizabeth of England, she was an able ruler and a patron of literature and art. She founded the University of Moscow in 1755, and increased the power of the clergy, whereby Church coffers waxed full, and magnificent churches were built. The worst feature of her reign was the establishment of a Court of Inquisition to punish political offenders, which resulted for many years in the tragedies of Siberian exile.

Concluded next month from Peter III.-Catherine II. to the present Tsar.

Hygiene, Sanitation and Epidemiology.

The H. K. Mulford Company announces the establishment of a department of Sanitation and Epidemiology, under the executive management of Thomas W. Jackson, M.D., expert in preventive medicine, sanitation and the study and control of epidemic diseases.

The most important subjects before the American and Canadian people at the present time relate to the public health. Work in this field is frequently beyond the reach of the existing health and sanitary departments of the various municipalities and smaller towns, on account of limited appropriations.

The department does not propose to enter into competition with the constituted public health authorities, local, state or federal, but to aid and assist these authorities in every possible way. The work is essentially one of service and education, and will be developed along these lines. The resources and equipment of the Mulford Laboratories, chemical and bacteriological, will be utilized, thus placing at the disposal of the new department the entire laboratory facilities and expert services of the H. K. Mulford Company.

The Great Consulting Room of a Wise Man is a Library—Dawson

HAZELL'S ANNUAL, 1916.

This well known and deservedly popular annual scores, as usual, many distinct successes. It has of late made a special feature of giving the personnel of government offices and important public bodies with greater fullness and detail than other works of reference, and we notice with interest that the staff of the new Ministry of Munitions is set out to the extent of some pages, no doubt officially, as is the case with the other offices. Other features which attract attention are a complete list of the recipients of the Victoria Cross (including even those announced on December 7th), and a Roll of Honor, containing some hundreds of names of those who have lost their lives in the war; it includes peers and sons of peers, baronets, knights and their sons, members of parliament and their sons, and members of distinguished families.

The section devoted to the British Colonies and self-governing Dominions is admirable in its up-to-dateness of statistics and administrative staffs. We note that Eygpt, the new Southwest Africa Protectorate, and the former German Pacific possessions are now marshalled in this section. The section containing the particulars of foreign countries is, for the same reason, most praiseworthy, the information given of foreign colonial possessions—of extra importance at the present time — is only equalled by specialized geographical publications.

Ten pages are devoted to aviation and some twenty pages to naval matters, and there is little pertaining to these subjects which does not find a place therein. The tables of warship types are very informative. The aviation article has a chronology of air raids by the Allies, air raids on Britain, and chapters on aeroplane and airship offensive and records of all descriptions. The general article on the war is of considerable length, and is a veritable storehouse for every incident and fact worthy to be recorded during the year. It is preceded by a summary of the events of 1914. The Naval Operations, "by a Naval Officer," form a chapter by themselves, and there are other articles on the financial side of the war, and on international treaties.

Hazell's Annual is the recognized publication to which everyone turns for particulars of the various learned societies, institutions and kindred bodies, and the 1916 edition certainly has a wonderful variety, numbering over a thousand; in each case the officials of these societies are given. We need say little of the standing features of the Annual, such as finance, trade, shipping, banks, agriculture, railways, insurance, wireless, etc.; they are well known to readers of the Annual, and are replete with the most detailed information; indeed, no important topic of the day is omitted.

The Annual is bound to be much consulted for the effect of the new taxation, which is dealt with very fully. The Income Tax article occupies several pages, and has elaborate tables showing the rates of income tax payable on various incomes, from the smallest upwards.

Finally, we must strongly commend the admirable index, well known as a model of the way in which the information contained in a comprehensive work of reference should be made available. Its 10,000 entries make it an unerring finger-post to the vast stores of information contained in Hazell.

THE BELOVED PHYSICIAN — EDWARD LIVINGSTON TRUDEAU—By Stephen Chalmers—With Illustrations—Houghton Mifflin Company—$1.00 Net.

He who would persuade the head of every family on earth to nail his bedroom windows permanently wide open would be the greatest of human benefactors. If, at the same time, he could give to every soul the uplift of a great hope and a lofty aspiration, he would be worthy of universal veneration.

Trudeau was the founder, at Lake Saranac in the Adirondacks, of the famous sanitarium for the treatment of tuberculosis by the open air method, after which at least half a thousand similar institutions in America have been modeled. He is one of the heroes of the romance of science. His was a Christian Science that did not sacrifice the intellect. The result of his work is familiar to millions who, because of his invincible modesty, have never heard his name.

The author of The Beloved Physician once showed an old prescription which Trudeau had used long before in Tuberculosis, and asked him what he would prescribe now —after thirty-five years. "That—if anything," he said, "but probably nothing—no physic at all. Open the window—go to bed—and keep your nerve."

Trudeau is in the same class with Pasteur and Grenfell. His heroism was sustained by an unconquerable optimism. His modesty was honest and beautiful. He never supposed himself to be better or braver than any decent person ought to be. The choice of the heroic course is always easy to the hero.

Every reader of this book, which is well written, will delight in the wholesome personality here so vividly presented in phrase and photograph. The author was a personal friend and confidant of the noble physician of whom he writes.

Fourteen illustrations, five of which are portraits of Trudeau, distinctly enhance the value of this book which is in Houghton Mifflin Company's well-known quality of workmanship.—A. D. W.

PUBLIC WELFARE

Who Will Win the War?

Great Britain was criticized at the beginning of the war because of her unpreparedness to overawe, and, if necessary, to crush her foe suddenly and decisively. Her unpreparedness is one of Britain's chief glories. If preparedness means that perpetual slavery that the war-footing implies, the constant challenge of other nations to touch us if they dare, it is better to be victims of a preparedness of which we are not guilty. Let us trust rather to a permanent international peace-understanding, and the honor which regards it as more than a scrap of paper.

Ideals are the best safeguards. A moral nation is invincible. The sword only postpones justice. Its decisions are all invalid in the final assize. When all the treaties that ignore fellowship and brotherhood are discredited, Justice insists upon treaties of humanity and peace.

"Put off, put off your mail, ye kings,
And beat your swords to dust,
A surer grasp your hands must know
Your hearts a better trust."

The great empires shook the world with their successive thunders. They settled nothing thereby. They are all gone. Their heroes are as dead as the leaves in their ancient gardens. The immortal names are not those of warriors. They are such names as Shakespeare and Socrates and Columbus. If, when the war is over, the human race is burdened with the insupportable waste of manhood and resources involved in unparalleled armies and invincible armadas, if this incubus of horror, this perpetual fear and insolent challenge is permitted to continue, then Prussianism has won the fight.

Millions of our men have fought because they have been told it was their duty to resist militarism, and drive Kaiserism off the face of the earth forever. If we fail to abolish great armies and war-factories, we shall break faith with the men who have given their lives for what they supposed was a great cause, but have been sacrificed to the war Moloch because our faith was less than a scrap of paper.

The cause of the war is the treachery of a few scoundrels who sought gain by stirring up conflict, and misled the people into a hate of which a better understanding will make them ashamed. The sword alone cannot bring peace, but those nations that suppress the war-factories of the world, especially their own, and whose magnanimity proves that they have abolished hate from their own hearts—these will win the war.—Albert D. Watson.

CANADIAN POETS

XXIII

DUNCAN CAMPBELL SCOTT

"He is above everything a poet of climate and atmosphere, employing with a nimble, graphic touch the clear, pure transparent colours of a richly-furnished palette. He leaves unrecorded no single phase in the pageant of the northern year, from the odorous heat of June to the ice-bound silence of December. His work abounds in magically luminous phrases and stanzas . . . . Mr. Scott is particularly happy in the phrases suggested to him by the songs of birds. . . . . There is scarcely a poem of Mr. Scott's from which one could not cull some memorable descriptive passage. . . . . As a rule Mr. Scott's workmanship is careful and highly finished. He is before everything a colourist. He paints in lines of a peculiar and vivid translucency. But he is also a metrist of no mean skill, and an imaginative thinker of no common capacity."—William Archer, in "Poets of the Younger Generation."

ONE of Canada's greatest poets was thus praised so highly and justly, seventeen years ago, by William Archer, the distinguished English critic; and since then, Duncan Campbell Scott has published considerable verse, more original, more human, more imaginative and philosophical. His latest work, "Lines in Memory of Edmund Morris," a poem of nearly three hundred lines, published by himself for private distribution, is so original, tender, and beautiful, it is destined to rank very high among the best in Canadian literature.

Mr. Scott was born in Ottawa, Canada, August 2nd, 1862, and was educated in the public schools of his native city, and at Stanstead Wesleyan Academy. He is of English and Scottish origin, son of the late Rev. William Scott (Methodist) and Janet (McCallum) Scott.

In 1894 he was married to Miss Belle W. (noted violinist), daughter of Mr. George W. Botsford, Greenfield, Massachusetts.

In 1880, Mr. Scott entered the Canadian Civil Service at Ottawa, in the Department of Indian Affairs, and ever since has been an official of this Department. Promotion after promotion rewarded his industry and efficiency until a year or two ago, he became Deputy Superintendent General. It was a fortunate appointment, thirty-five years ago, in another sense, for his associations with the Redmen have inspired and colored a number of his most original poems.

The following are the names and dates of Mr. Scott's most notable publications: "The Magic House and Other Poems" (1893), "In the Village of Viger" (1896), "Labour and the Angel" (1898) "New World Lyrics and Ballads" (1905; Morang & Co., Limited, Toronto), "John Graves Simcoe" (1905; "Makers of Canada" series, edited by him and Prof. Pelham Edgar), " Via Borealis" (1906), and "Lines in Memory of Edmund Morris" (1915), mentioned above.

In 1908, Mr. Scott won the $100 Globe Prize for the best historical poem of the year.

Many admirers of this author would like to see issued at an early date a collected edition of his poems.

THE VOICE AND THE DUSK

The slender moon and one pale star,
A rose leaf and a silver bee
From some god's garden blown afar,
Go down the gold deep tranquilly.

Within the south there rolls and grows
A mighty town with tower and spire,
From a cloud bastion masked with rose
The lightning flashes diamond fire.

The purple martin darts about
The purlieus of the iris fen;
The king-bird rushes up and out,
He screams and whirls and screams again.

A thrush is hidden in a maze
Of cedar buds and tamarac bloom,
He throws his rapid flexile phrase,
A flash of emeralds in the gloom.

A voice is singing from the hill
A happy love of long ago ;
Ah ! tender voice, be still, be still,
"'Tis sometimes better not to know.'

The rapture from the amber height
Floats tremblingly along the plain,
Where in the reeds with fairy light
The lingering fireflies gleam again.

Buried in dingles more remote,
Or drifted from some ferny rise,
The swooning of the golden throat
Drops in the mellow dusk and dies.

A soft wind passes lightly drawn,
A wave leaps silverly and stirs
The rustling sedge, and then is gone
Down the black cavern in the firs.

THE SEA BY THE WOOD

I dwell in the sea that is wild and deep,
But afar in a shadow still,
I can see the trees that gather and sleep
In the wood upon the hill.

The deeps are green as an emerald's face,
The caves are crystal calm,
But I wish the sea were a little trace
Of moisture in God's palm.

The waves are weary of hiding pearls,
Are aweary of smothering gold,
They would all be air that sweeps and swirls
In the branches manifold.

They are weary of laving the seaman's eyes
With their passion prayer unsaid,
They are weary of sobs and the sudden sighs
And movements of the dead.

All the sea is haunted with human lips
Ashen and sere and gray,
You can hear the sails of the sunken ships
Stir and shiver and sway

In the weary solitude ;
If mine were the will of God, the main
Should melt away in the rustling wood
Like a mist that follows the rain.

But I dwell in the sea that is wild and deep
And afar in the shadow still,
I can see the trees that gather and sleep
In the wood upon the hill.

THE WOOD BY THE SEA

I dwell in the wood that is dark and kind
But afar off tolls the main,
Afar, far off I hear the wind.
And the roving of the rain.

The shade is dark as a palmer's hood,
The air with balm is bland :
But I wish the trees that breathe in the wood
Were ashes in God's hand.

The pines are weary of holding nests,
Are aweary of casting shade ;
Wearily smoulder the resin crests
In the pungent gloom of the glade.

Weary are all the birds of sleep,
The nests are weary of wings,
The whole wood yearns to the swaying deep,
The mother of restful things.

The wood is very old and still,
So still when the dead cones fall.
Near in the vale or away on the hill,
You can hear them one and all.

And their falling wearies me ;
If mine were the will of God.—O, then
The wood should tramp to the sounding sea.
Like a marching army of men !

But I dwell in the wood that is dark and kind,
Afar off tolls the main ;
Afar, far off I hear the wind
And the roving of the rain.

THE BUILDER

When the deep cunning architect
Had the great minster planned,
They worked in faith for twice two hundred years
And reared the building grand ;
War came and famine and they did not falter,
But held his line,
And filled the space divine
With carvings meet for the soul's eye ;
And not alone the chantry and thereby
The snowy altar,
But in every part
They carved the minster after his own heart,
And made the humblest places fair,
Even the dimmest cloister-way and stair,
With vineyard tendrils,
With ocean-seeming shells,
With filmy weeds from sea,
With bell-flowers delicate and bells,
All done minute with excellent tracery.

Come, O my soul,
And let me build thee like the minster fair,
Deep based and large as air,
And full of hidden graces wrought
In faith and infinite thought,
Till all thy dimmest ways,
Shall gleam with little vines and fruits of praise.
So that one day
The consummate Architect
Who planned the souls that we are set to build,
May pause and say :
How curiously wrought is this!
The builder followed well My thought, My chart
And worked for Me not for the world's wild heart :
Here are the outward virtues true !
But see how all the inner parts are filled
With singular bliss :
Set it aside
I shall come here again at eventide.

THE FORGERS

In the smithy it began :
Let's make something for a man !
Hear the bellows belch and roar,
Splashing light on roof and floor :
From their nest the feathery sparks
Fly like little golden larks :
Hear each forgers taunting yell,
Tell—tell—tell—tell—
Tell us what we make, my master !
Hear the tenor hammers sound.

Ring-a-round, ring-a-round ;
Hear the treble hammers sing,
Ding-a-ring, ding-a-ring ;
Hear the forger's taunting yell,
Tell—tell—tell—tell !
Though the guess be right or wrong
You must wear it all life long !
How it glows as it grows,
Ding-a-ring-a-derry-down,
Into something—is't a crown ?

Hear them half in death with laughter,
Shaking soot from roof and rafter ;
Tell—tell—tell—tell—
Ding-a-ring, ding-a-ring,
See them round the royal thing,
See it fade to ruby rose,
As it glows and grows,
Guess, they shout, *for worse or better* :
Not a crown !
Is't a fetter ?
Hear them shout demonic mirth :
Here's a guesser something worth ;
Make it solid, round, and fine,
Fashioned on a cunning plan,
For the riddle-reader Man ;
Ho—ho—ho—ho !
Hear the bellows heave and blow :
Heat dries up their tears of mirth ;
Let the marvel come to birth,
Though his guess be right or wrong
He must wear it—all life long !
Sullen flakes of golden fire
Fawn about the dimming choir,
They're a dusky pack of thieves
Shaking rubies from their sleeves,
Hear them wield their vaunting yell,
Tell—tell—tell—tell!
Forging faster—taunting faster—
Guess, my master—Guess, my master !
Grows the enigmatic thing !
Ruddy joyance—Deep disaster ?
Ding-a-ring, ding-a-ring,
Ding-a-ring-a-derry-down !
Is't a fetter—Is't a crown ?

AT THE CEDARS

You had two girls—Baptiste—
One is Virginie—
Hold hard—Baptiste!
Listen to me.

The whole drive was jammed
In that bend at the Cedars,
The rapids were dammed
With the logs tight rammed
And crammed; you might know
The Devil had clinched them below.

We worked three days—not a budge,
'She's as tight as a wedge, on the ledge,'
Says our foreman;
'Mon Dieu! boys, look here,
We must get this thing clear.'

He cursed at the men
And we went for it then;
With our cant-dogs arow,
We just gave he-yo-ho;
When she gave a big shove
From above.

The gang yelled and tore
For the shore,
The logs gave a grind
Like a wolf's jaws behind,
And as quick as a flash
With a shove and a crash,
They were down in a mash,
But I and ten more,
All but Isaac Dufour,
Were ashore.

He leaped on a log in the front of the rush,
And shot out from the bind
While the jam roared behind;
As he floated along
He balanced his pole
And tossed us a song.
But just as we cheered,
Up darted a log from the bottom,
Leaped thirty feet square and fair,
And came down on his own.

He went up like a block
With the shock,
And when he was there
In the air,
Kissed his hand to the land;
When he dropped
My heart stopped,
For the first logs had caught him
And crushed him;
When he rose in his place
There was blood on his face.

There were some girls, Baptiste,
Picking berries on the hillside,
Where the river curls, Baptiste,
You know—on the still side.
One was down by the water,
She saw Isaac
Fall back.

She did not scream, Baptiste,
She launched her canoe;
It did seem, Baptiste,
That she wanted to die too,
For before you could think
The birch cracked like a shell
In that rush of hell,
And I saw them both sink—

Baptiste!—
He had two girls,
One is Virginie,
What God calls the other
Is not known to me.

IN THE COUNTRY CHURCHYARD

To the Memory of My Father

This is the acre of unfathomed rest,
These stones, with weed and lichen bound, enclose
No active grief, no uncompleted woes,
But only finished work and harboured quest,
And balm for ills;
And the last gold that smote the ashen west
Lies garnered here between the harvest hills.

This spot has never known the heat of toil,
Save when the angel with the mighty spade
Has turned the sod and built the house of shade;
But here old chance is guardian of the soil;
Green leaf and grey,
The barrows blossom with the tangled spoil,
And God's own weeds are fair in God's own way.

Sweet flowers may gather in the ferny wood:
Hepaticas, the morning stars of spring;
The bloodroots with their milder ministering,
Like planets in the lonelier solitude;
And that white throng,
Which shakes the dingles with a starry brood,
And tells the robin his forgotten song.

These flowers may rise amid the dewy fern,
They may not root within this antique wall,
The dead have chosen for their coronal,
No buds that flaunt of life and flare and burn;
They have agreed,
To choose a beauty puritan and stern,
The universal grass, the homely weed.

This is the paradise of common things,
The scourged and trampled here find peace to grow,
The frost to furrow and the wind to sow,
The mighty sun to time their blossomings;
And now they keep
A crown reflowering on the tombs of kings,
Who earned their triumph and have claimed their sleep.

Yea, each is here a prince in his own right,
Who dwelt disguised amid the multitude,
And when his time was come, in haughty mood,
Shook off his motley and reclaimed his might;
His sombre throne
In the vast province of perpetual night,
He holds secure, inviolate, alone.

The poor forgets that ever he was poor,
The priest has lost his science of the truth,
The maid her beauty, and the youth his youth,
The statesman has forogt his subtle lure,
The old his age,
The sick his suffering, and the leech his cure,
The poet his perplexed and vacant page.

These swains that tilled the uplands in the sun
Have all forgot the field's familiar face,
And lie content within this ancient place,

Whereto when hands were tired their thought would run
To dream of rest,
When the last furrow was turned down, and won
The last harsh harvest from the earth's patient breast.

O dwellers in the valley vast and fair,
I would that calling from your tranquil clime,
You make a truce for me with cruel time;
For I am weary of this eager care
That never dies;
I would be born into your tranquil air,
Your deserts crowned and sovereign silences.

I would, but that the world is beautiful,
And I am more in love with the sliding years,
They have not brought me frantic joy or tears,
But only moderate state and temperate rule;
Not to forget
This quiet beauty, not to be Time's fool,
I will be man a little longer yet.

For lo, what beauty crowns the harvest hills!—
The buckwheat acres gleam like silver shields;
The oats hang tarnished in the golden fields;
Between the elms the yellow wheat-land fills;
The apples drop
Within the orchard, where the red tree spills,
The fragrant fruitage over branch and prop.

The cows go lowing through the lovely vale,
The clarion peacock warns the world of rain,
Perched on the barn a gaudy weather-vane;
The farm lad holloes from the shifted rail,
Along the grove
He beats a measure on his ringing pail,
And sings the heart-song of his early love.

There is a honey scent along the air;
The hermit thrush has tuned his fleeting note.
Among the silver birches far remote
His spirit voice appeareth here and there,
To fail and fade,
A visionary cadence falling fair,
That lifts and lingers in the hollow shade.

And now a spirit in the east, unseen,
Raises the moon above her misty eyes,
And travels up the veiled and starless skies,
Viewing the quietude of her demesne;
Stainless and slow,
I watch the lustre of her planet's sheen,
From burnished gold to liquid silver flow.

And now I leave the dead with you, O night;
You wear the semblance of their fathomless state,
For you we long when the day's fire is great,
And when stern life is cruellest in his might,
Of death we dream:
A country of dim plain, and shadowy height,
Crowned with strange stars and silences supreme:

Rest here, for day is hot to follow you,
Rest here until the morning star has come,
Until is risen aloft dawn's rosy dome,
Based deep on buried crimson into blue,
And morn's desire
Has made the fragile cobweb drenched with dew
A net of opals veiled with dreamy fire.

Closing paragraphs of "Lines in Memory of Edmund Morris"—

Here Morris, on the plains that we have loved,
Think of the death of Akoose, fleet of foot,
Who, in his prime, a herd of antelope
From sunrise, without rest, a hundred miles
Drove through rank prairie, loping like a wolf,
Tired them and slew them, ere the sun went down.

Akoose, in his old age, blind from the smoke
Of tepees and the sharp snow light, alone
With his great grandchildren, withered and spent,
Crept in the warm sun along a rope
Stretched for his guidance. Once when sharp autumn
Made membrances of thin ice upon the sloughs,
He caught a pony on a quick return
Of prowess and, all his instincts cleared and quickened,
He mounted, sensed the north and bore away
To the Last Mountain Lake where in his youth
He shot the sand-hill-cranes with his flint arrows.
And for these hours in all the varied pomp
Of pagan fancy and free dreams of foray
And crude adverture, he ranged on entranced,
Until the sun blazed level with the prairie,
Then paused, faltered and slid from off his pony.
In a little bluff of poplars, hid in the bracken,
He lay down; the populace of leaves
In the lithe poplars whispered together and trembled,
Fluttered before a sunset of gold smoke,
With interspaces, green as sea water,
And calm as the deep water of the sea.

There Akoose lay, silent amid the bracken,
Gathered at last with the Algonquin Chieftains.
Then the tenebrous sunset was blown out,
And all the smoky gold turned into cloud wrack.
Akoose slept forever amid the poplars,
Swathed by the wind from the far-off Red Deer
Where dinosaurs sleep, clamped in their rocky tombs.
Who shall count the time that lies between
The sleep of Akoose and the dinosaurs?
Innumerable time, that yet is like the breath
Of the long wind that creeps upon the prairie
And dies away with the shadows at sundown.

. . . . .

What we may think, who brood upon the theme,
Is, when the old world, tired of spinning, has fallen
Asleep, and all the forms, that carried the fire
Of life, are cold upon her marble heart—
Like ashes on the altar—just as she stops,
That something will escape of soul or essence,—
The sum of life, to kindle otherwhere:
Just as the fruit of a high sunny garden,
Grown mellow with autumnal sun and rain,
Shrivelled with ripeness, splits to the rich heart,
And looses a gold kernel to the mould,
So the old world, hanging long in the sun,
And deep enriched with effort and with love,
Shall, in the motions of maturity,
Wither and part, and the kernel of it all
Escape, a lovely wraith of spirit, to latitudes
Where the appearance, throated like a bird,
Winged with fire and bodied all with passion,
Shall flame with presage, not of tears, but joy.

Art and Artists in Canada

By KATHERINE HALE

THE most important concert in the month of January was the appearance in Massey Hall, Toronto, on the 20th, of the New York Symphony Orchestra, under the baton of Mr. Walter Damrosch, with the great Russian violinist, Mischa Elman, as soloist.

As it happened to be the evening of Elman's twenty-fifth birthday, a glance at his career may be of interest. At the age of five he made his debut in Odessa. At thirteen he was substituting for his teacher, Leopold von Auer, in concert at St. Petersburg with such success that a tour of Germany was arranged. At fourteen he made a sensational success in London by playing the Tschaikowsky Concerto. His first American tour was in 1908, since which time he has been heralded as the greatest among violinists.

Walter Damrosch, always one of the most interesting of the American musicians, really inherits his orchestra, for it was founded in 1878 by his father. It is now three decades since the son took Leopold Damrosch's place, and, although only fifty-three years of age, he is already "the dean of American conductors." As a programme maker he is famous, and has had the honor of introducing on this continent the symphonic work of Brahms, Tschaikowski, Sibelius, Elgar, Debussy, Duckas, Chausson, Revel and others. A little over a year ago Mr. Harry Harkness Flagler, president of the Symphony Society of New York, endowed the Damrosch Orchestra to the extent of $100,000 annually. Already this splendid gift is exerting its influence on music not only in New York, but throughout the continent, since it allows the conductor a free hand to do his work under ideal conditions.

As one listened to the wonderful music—and, after all, in orchestral music lies the most potent painting of emotion that any art can give us—the wonder grew that so far no Canadian, and there are many Canadians quite wealthy enough to endow an orchestra, has cared enough for music, or sufficiently realized the vital importance of an orchestra in the musical life of the community, to place one band of musicians in this country on a safe footing. In the case of Toronto the Symphony Orchestra here, under the leadership of Mr. Frank Welsman, had just got to the point where it was ready for big work when it was obliged to disband because of financial restrictions. Already the organization had brought to Ontario the best soloists that visited us during the six years of its existence, and engagements to play in other Canadian cities had been successfully met. Popular concerts, where the best music was given to the people at reasonable prices, occurred each season. Then, like the merest candle flame, all the light and beauty, the effort of years, and the effect of almost daily ensemble work for the musicians, went out—simply for lack of the financial backing that every orchestra must have, no matter how large a centre in which it works.

In reply to the inevitable retort "this is a time for supplying munitions, not music," I should say that there is no time when people need music so much as they do now, that there is no influence more sane and clear, that music indeed is a thought medium which may re-act to this supreme tragedy of humanity by acquiring qualities that are reconstructive. And as the embroideries are ruthlessly stripped from life, and only the necessities remain, it may be that in Canada the need for a permanent band of orchestral players may be felt and the need supplied.

The Academy String Quartette is a musicianly organization. We are fortunate to have in this country such a noted violinist and concert meister as Mr. Luigi von Kunits, whose long association with the Paur Orchestra of Chicago made him one

of the conspicuous figures on the concert stage of America. Associated in this quartette with Mr. von Kunits are Mr. Arthur Ely, second violinist, Mr. Alfred Bruce, viola, and Mr. George A. Bruce, cellist. A series of four chamber concerts, one a month, which the quartette are giving at the Academy of Music are delightful. The January programme included the Schumann A Minor (Op. 41, No. 1), and the Beethoven Quartette in B flat Major, Op. 130, in which occurs the great love song of the famous Cavatina, with its strange sweetness and that sense of foreboding which hangs forever over the work of he whom Wagner has called "Our Saint."

January and the first of February saw the performances of the National Chorus and the Mendolssohn Choir—war having depleted the ranks of the Schubert Choir so seriously that it is impossible for them to give a concert this season. The Mendelssohn Choir seems to me to be a typically Canadian institution. There is an echo of our long white winter nights and gleaming suns in the quality, high and intense, that pervades this band of singers. The National Chorus, under the baton of Dr. Albert Ham, is also a Canadian organization, but it is more typical of English than American choir singing, and the zest and fine enunciation of such patriotic pieces as "The Banner of St. George" and "Land of Hope and Glory" by that most English of composers, Elgar, shows where the heart of the Chorus lies. It would be hard to imagine a better rendering of these numbers, or indeed of "Death On the Hills"—a dramatic poem set to colorful music by the same author —than this choir gives. The concert on January 18th was attended by the Duke and Duchess of Connaught and the Princess Patricia. The programme included twenty-four songs and choruses and the programme was over by 10.15, as all good concerts should be. The soloist of the evening, Mr. Morgan Kingston, possesses one of those robust tenor voices which has a sympathetic quality. In Arthur Sullivan's well known ballad "The Soldier's Grave," Mr. Kingston created a vivid picture in the splendid words and music, especially the final verses—

Sleep on, thou mighty dead!
A glorious tomb they've found thee.
The broad blue sky above thee spread,
The boundless waters round thee.
No vulgar foot treads here;
No hand profane shall move thee;
But gallant fleets shall proudly steer,
And warriors shout above thee.

And when the last trump shall sound
And tombs are asunder riv'n—
Like the morning sun from the wave
thou'lt bound,
To rise and shine in Heaven.

It is only natural perhaps that music, the most responsive of the arts, should reflect the life of the people and those of us who go to concerts in these days of war and of death know that the shadow which rests over the world is reflected here. On a programme where a Tschaikowsky Requiem is sung "In memory of those who have fallen in the war," and our buglers play "The Last Post," it is impossible to infuse a spirit of gayety. Dr. Ham's programme voiced the mood in which we move to-day.

Paderewski, in a talk on the probable influence of the war on music, has recently declared it to be his opinion that for a time, at all events, the mammoth size of orchestras will in all probability be cut down for want of funds to pay for the maintenance of these huge bodies of instrumentalists for which composers have so long been writing. That must of necessity affect the nature of compositions put forth, to the extent, at least, of reducing swollen instrumentation and excesses of counterpoint.

"At last we shall see the musician put to it to regard primarily what he is expressing, not how he is expressing it. Luxury, the overabundance of means that stifles the spirit, must be discarded before true advancement can take place—and the age which is passing unquestionably gave itself too freely to luxury of one kind or another. In every walk of life, in every function of existence, it has had its baleful effect. In our art, on the one hand, as in our food on the other, we have suffered from this handicap of excess.

"True, much has been written of late; and I should be far from denying the existence of many clever composers. But humanity will feel the need of more than cleverness. What has been given us for a number of years it oratory, not poetry. And by such we can not live, however polished, elegant, and graceful its expression. We may evolve a Beethoven; we may not. But Beethoven is the supreme summit, and we shall also require our small hills and analogous figures. May we not look for a similar resurgence of the artist-spirit when this catastrophe has run its course? I see no reason to doubt it, since history has a manner of repeating itself."

A correspondent writing from Whitby to the Public Health Journal says: "Certainly it is the unusual that daily happens during this war time, and we are constantly being forced out of our groove by extra-

"FRENCH NUN" by Florence McGillivray

even our valleys. The awakening must bring lesser as well as greater prophets.

"The precedent of history would lead us to look for a great renaissance at the close of this struggle. After the French Revolution came Beethoven, and when the Napoleonic wars ended there emerged Chopin, Schumann, Liszt, Wagner, and lesser though talented men such as Mendelssohn, Meyerbeer and others. In poetry, Heine, de Musset, Pushkin, and a number of great Polish writers insufficiently known to other nations sprang up. And in other arts were

ordinary events. Who would have expected in a quiet Canadian county town to find a one-man exhibition of modern art, salon pictures colored by the touch of the futurist and cubic schools, which have caused such an awakening in French art! Yet, this is what fate threw into the social life of Whitby.

Miss Florence McGillivray, who has been studying in Paris, sketching during the summer days in Britain and France, found no resting place there once war had upset the artists' calm life and had to wend her

way to Italy only to decide to return home to work and wait in Canada for happier days. Her exhibition in Montreal and later in New York was greatly appreciated, but the call of home was so persistent that she decided to come back to Whitby, where she has lately given an exhibition that was interesting and striking in a degree, illustrating as it did the versatility of the modern artist. The strong and vivid coloring made one feel the poetic and realistic touch of both Simon and Maynard in her work, but with a broader and deeper thought through-great Russian artist, Monsieur Fiebig. The collection is quite unique. The strength of the stern French nun, which she had the honor of having hung in the salon, contrasted with the dreamy poetic look of a Brittany girl were notable, while the "Pines," done since returning to Canada, is a gem of color.

Some of Miss MacGillivray's pictures will be on exhibition at the Helliconian Club this month.

"The dramatization of a great epic poem has a deep national significance," said Mr. Alan Sullivan, when interviewed on the coming production in February of "The Dynasts," a great pageant play by Thomas Hardy, which will be presented in Toronto, by the largest force of amateurs ever gathered together in Canada. The story depicts the Napoleonic war from the viewpoint of the common people and from that of the historian, its twenty-five scenes being enacted by some 200 local people.

Lady Drummond saw the pageant in London. Being closely associated with the work of the Canadian Red Cross, she asked Mr. Frank Lascelles, who was going to New York on government business, if he could arrange for the production of "The Dynasts" in Canada. Mr. Lascelles arranged the Durbar, the London and the Oxford pageants, the Quebec Tercentenary pageant. He is honorary producer of the pageant in Canada. Mr. Alan Sullivan is the honorary general manager. For 75 per cent. gross of the takings they were able to arrange with the theatre and with Baring and Company, of New York, to provide the costumes and a professional stage manager, who will be here three weeks before the production, in fact "to put on the play."

"We are not under the auspices of any organization, so we are able to solicit the support of all," said Mr. Sullivan. "We take no financial risk and we ask no financial support. I have been to Ottawa to see the Duke and Duchess of Connaught and they gave me their warmest support."

MEDICO-MILITARY NOTES FROM THE BELGIAN WAR ZONE*

By CAPT. JOHN D. SPELMAN, C.M., Ohio N. G.
(With the American Red Cross in Belgium)

ONE CANNOT see a life history of great promise end in a tragic chapter, far from home or kin, without thinking of what Sherman said. But can you think of anything that brings out the good in man to better advantage? Cowardice is a rare thing; almost every man in all the European armies daily displays bravery that would in peace time win for him a crown of laurel.

The accomplishment of the men who dedicate their energies to the temporary business of war is no less praiseworthy; and of thes eachievements, those of the men who guard the health and welfare of the soldiers stand out preeminently. Every safeguard known to modern science is diligently employed, and the result is conclusively reflected in the very small percentage of ineffectives from preventible diseases; this being the first war in history that can boast of this class of cases being kept far below legitimate battle casualties.

Anti-typhoid vaccination has scored a high rate of efficiency, and in spite of the pressure of war work, efforts are being made toward its improvement. The Pasteur Institute in Paris is now working with living, attenuated bacilli, but I hardly think it has as yet improved in efficiency on vaccine made after the method of Major Russell of our Army.

Routine sanitation is carefully observed, and typhus has failed of a foothold because the precepts of the American discoverers of its method of transmission are recognized. We find make-shift shower baths as close up as the second line of trenches, and bath trains and bathing establishments take care of the troops as soon as they leave the trenches, while the sterilizer is freeing their clothing of the troublesome trench insects.

The control of venereal diseases is quite effectual, due principally to the banishment of the usual train of camp-followers, and rigid medical inspection previous to and after furlough or "town-leave." There are stringent police regulations, which control drinking and prostitution in all the base-towns.

Tetanus, by reason of the deep, ragged and dirty wounds, should by all the rules be rampant, but a case of lock-jaw is rarely seen in the surgical hospitals, because the infection of all patients with the preventive serum has become part of the very first treatment.

I have never seen the capacity of the relatively few medical hospitals taxed, and the separation of the medical and surgical cases is rigidly observed.

While the commissary supply is not strictly in the province of the medical department, it naturally deserves consideration with the health of troops. The food requirements of the Belgian troops are very simple; their messes consist principally of soups and thin stews, with plenty of bread. The English soldier

*Reprinted from the Military Surgeon.

seems quite satisfied with his fare except for occasional outbursts against "bully" beef. There was a considerable wastage at first, principally due to the excellent parcel-post system, which brought provisions from the soldiers' home-folk and caused a duplication of supply. The French supply system is most commendable, because of the absence of a too arbitrary regulation. General Joffre boasts that he is his own commissary, and the satisfaction of his troops speaks well for his system. Every French officer has the authority to buy any special article of diet that opportunity affords and desire demands, and his Government is responsible for the expense incurred. I am not sure this system could operate without abuse elsewhere, but here the naturally frugal disposition of the Frenchman insures its success. Their diet differs in what our soldiers would need principally in the low meat requirement (usually served twice weekly.) The caloric requirement is maintained by substitution of wine, which pleases the soldier, and furnishes for F.30 the number of calories that would represent meat to the value of F2.00.

The service of evacuation has been excellent, especially since the passing of the chaos consequent upon the initial campaign. In its general scheme it is not unlike the working plan of our own army medical service. Taking that of the British as an example of all, we find the service at the front of two kinds of formations—those of armies and those of divisions. The former are under a director of medical service, who, while responsible for the technical workings of all the medical service within his army, has under his direct control the larger clearing stations established near railheads, the motor ambulance convoys and all sanitary arrangements in his particular area. The divisional formations are under the assistant director of medical service, who controls the field ambulances, dressing stations, aid posts and sanitary sections in the divisional area.

The work is conducted as follows: A soldier falls during an advance and is left lying in the fire-swept open. From this hazardous position he is rescued by two stretcher-bearers, who choosing their moment, rush across, pick him up and carry him back to the shelter of a trench. These bearers may be of his own unit (sixteen men of which in the case of an infantry battalion are following their command), or they may be men of the Royal Army Medical Corps, belonging to a bearer subdivision of a field ambulance.

They will take him to his "regimental aid-post," possibly situated in a dug-out, in a cellar, or some sheltered spot, giving cover from fire, where he receives attention from the Royal Army Medical Corps officer attached to the battalion. From there he will be conveyed on a stretcher, or if circumstances permit and a road is handy, by an ambulance to the nearest dressing station. At this point he passes from regimental care into the charge of a divisional field ambulance, which is composed of three sections, each consisting of a bearer subdivision and a tent subdivision. The former collect the wounded and the latter are used as dressing stations which are pushed as far forward as possible, usually along a road.

Upon the arrival at one of these stations, the wounded soldier is given a permanent dressing and injected with anti-tetanic serum. From here he is sent by ambulance to the larger, semi-permanent dressing station, further to the rear, usually in a school or convent, where he receives food and drink if circumstances permit. Here the wounded are sorted, according to the nature of their wounds, preparatory to their transportation to the casualty clearing stations, passing from divisional control into the formations that are controlled by the army. The necessary conveyance is furnished by a motor transport unit, and these casualty clearing stations are usually situated at a rail-head.

The hospital facilities, per se, are not very elaborate, as only very serious cases, usually injuries to the head and abdomen that can not be moved without grave danger, are detained. They are equipped and staffed for 200 patients;

but their organization is sufficiently elastic to cope with much larger numbers during the progress of a battle, and special arrangements are made, augmenting their staff, whenever severe pressure is expected.

From the point where wounded are loaded on trains, they leave the collecting zone and enter the evacuating zone, coming into the charge of the line of communicaiion. These hospial rains are permanenly equipped as such, the newer ones having been designed and built for this special purpose. They are usually personneled by three Royal Army Medical Corps officers and forty-seven men, and carry a varying number of wounded, depending on the nature of the injuries, i.e., whether the sitting or recumbent cases predominate.

These trains bring the wounded to the base where stationary and general hospitals are situated. These are equipped with all modern appliances of first-class hospitals and are staffed with female nurses. The Red Cross or voluntary hospitals are also found at the base, but they are invariably commanded and administered by an army officer.

Since about October 3 of last year, the line of the western front has remained practically stationary and the evacuation service has been slightly changed to meet the new condition. Most noteworthy is the permanent character that the field hospitals have taken; their position is still that of a field hospital but their equipment has become that which is usually found in base hospitals. The absence of active campaign has minimized the wounded and obviated the necessity for immediate evacuation from these hospitals, so that the wounded are allowed to remain until all danger of complication has passed. This fact increases interest at the front, but has made mere infirmaries of the hospitals in the rear.

This stationary condition of the lines has helped to solve the problem presented by wounds of certain regions, particularly of the head and abdomen. The necessity for early operation was recognized, but the demand for complete rest and careful nursing presented the difficulty. We have heard much of sanitary trains de luxe and ambulances equipped with operating rooms, and I can testify from having seen them in storage that they are pretty to look at and must represent the expenditure of quite a sum of money. That responsible authority realizes that operations cannot be performed during a bumping trip over well-worn roads is testified to by the fact that these operating rooms and two-bed wards are all in storage at the bases.

Operating and nursing facilities are now afforded, usually as part of the casualty clearing station, for this special class of head and abdomen cases, from 5 to 7 miles from the trenches, where the cases are brought in within about two hours. The utilization of hospital boats on the excellent system of canals in northern France furnishes smooth water transportation to a limited extent.

There is still some room for improvement on the present system. Our ambulance was but seven miles from the front and received cases in some instances as early as an hour. These cases received their first dressing in the trenches, the material for which is usually supplied by the first-aid packet. They were then removed by litter to their respective aid stations, usually in a farmhouse which had been partially destroyed by shell, where they were often again dressed while waiting for the ambulance convoy, which required the shelter of darkness to come this far up with any degree of safety. They were then taken to the local clearing station which was situated at Odinkirke. Removal of the dressing was necessitated here, so that the surgeon could intelligently sort the cases for distribution to the surrounding hospitals, and make out their diagnosis and assignment cards. When they arrived at La Panne, where our ambulance was situated, the dressing was again removed for the more or less extensive operation of cleaning up in a surgical way. They thus received usually four and often five dressings in the course of a few hours.

If a diagnosis card with an intelligent description of the wound had been made out at an earlier period of their trip, time, dressing material and some trauma would have been conserved.

There is great support from many quarters for the use of Tr. Iodine in an ampoule or swab arrangement, in conjunction with the first-aid packet. The effectiveness of Tr. Iodine on suppurating wounds has been amply demonstrated, but its use before suppuration is positively counter-indicated. It forms a coagulated film of albumen about the wound and reduces the vitality of the tissue, thus insuring favorable culture media for any germs that might otherwise be taken care of by natural leucocytosis. If some medicinal agent is needed, why is not turpentine selected? Its general use by painters and carpenters explains the rarity of infection of their very frequent wounds, and its efficient penetrating power is demonstrated by the ability to recover in the urine the amount applied to the skin surface. The tin containers for these packets also seem to have been generally discarded, because the amount of damage done when a projectile strikes the location in which they are carried is out of all proportion to the increased insurance of sterility of the dressing, as when waxed paper and cotton containers are used.

We cannot leave the subject of evacuation without a brief reference to another class of hospitals which are situated but a short distance from the trenches, to receive the sick directly from their command and to which place all doubtful cases are referred. The principal duty of this hospital is to detect malingery. Faked illness is not altogether uncommon, and has at frequent intervals become epidemic in all the wars of past history. Many unusual methods of acquiring have been detected, such as the use of picric acid to stimulate jaundice, the smoking of cigarettes containing sodium chloride, to produce an ashen pallor, and the rubbing with sand to acquire a dermatitis.

A number of our best known surgeons have visited Europe and taken service in one of the many hospitals, principally those in the large cities at some distance from the front. Many have accomplished most erudite and commendable work, especially in the field of plastic surgery. A few, however, remained only long enough to exchange greetings and hurried back home, to recount their observations on war-surgery to an admiring coterie, who had or possibly would refer work to them. In some instances this capitalization of imagination approached the proportion of an organized lecture tour. I know one instance, where a surgeon from our own state returned to his native city, only to find that one of his confreres had booked the larger surrounding cities and left nothing but the smaller villages to operate in. We can readily see why accounts of war surgery are heterogeneous and sometimes apparently contradictory. The different phases of wound healing and the surgery indicated by the complications thereof, are limited only by the various distances from the front at which medical establishments may be situated.

The character of the wounds are dependent on their causative factor and their location. The rifle ball is the most benign of all projectiles, principally due to the low percentage of infection in wounds of this character. From the heat generated by its friction through the gun barrel and the air, it is capable of sterilizing the relatively small wound it makes. Because its range is so great, it usually reaches the target before its course becomes unstable, and the small diameter of the wound of entrance indicates small possibility of carrying pieces of the soldier's clothing before it and into the deeper parts of the wound. This, of course, does not hold true when the flight of the bullet is unstable, due to the distance it travels, or to ricochet. Under these conditions, its presenting diameter approaches the maximum (as when it strikes flat-wise), and the increased liability to consequent infection is directly proportionate to foreign matter, as clothing or skin, which it may carry before it. Much has been said of the diagnostic value, in a medico-legal sense, concerning the relative size

of the wounds of entrance and exit in penetrating rifle wounds. Certainly the rule is for the exit wound to be the larger, but numerous cases are observed in which the converse is true. This is a very important point to consider when presenting evidence in cases up for court-martial for auto-mutilation. When the weapon is discharged sufficiently close, the area of powder burn about the entrance wound settles the question; but in its absence decision is often difficult, because the extreme stability of the projectile, due to close range, causes the entrance and the exit wound to be about the same size. It has been observed that the small bones of the feet and hands, especially the thumb and forefinger, are the locations of choice for self-inflicted wounds.

Great damage is, however, done to structures offering resistance, as bone for instance, which is often greatly comminuted. At the point in a projectile's trajectory where it is most unstable, roughly just after its start and just before its end, it is most liable to cause the greatest damage. The little resistance that the skin affords may be sufficient to cause an eccentric wabbling, which grinds the softer tissue underneath into a pulpy mass, making a hole underneath the skin out of all proportion to what the small entrance wound would indicate. This space of subcutaneous maceration is sometimes described as the space of attrition, and may also be caused by the projectile invaginating a large mass of muscle before it.

The wounds caused by shrapnel balls are sometimes of the penetrating character. I have seen them penetrate one thigh and the scrotum and inpinge on and fracture the femur of the other thigh. But this is the exception rather than the rule, and shrapnel balls wound relatively superficially and do little damage, except that consequent on the carrying in of infection, and the injury to vital structures as large blood vessels. They sometimes produce fracture, but often may be found flattened out against the bone which stops their course without resulting in fracture. They may have just sufficient velocity to penetrate a limb and be stopped by the resistance of the skin on the opposite side, where they are readily located by palpation and delivered through a small incision. A shrapnel is a thin cylindrical case closed at one end and containing round balls made of lead, with some hardening substance, which it is designed to carry to a point a short distance from its target, and discharge its contents with an increased velocity over a considerable area by means of a fuse head connected with a powder charge in the base. The shrapnel ball has a high velocity for only a short period and was for this reason comparaticely ineffectual, so that the old variety has given place to the high explosive shrapnel, the charge of which is heavier, resulting in the blowing of the casing into fragments having a high velocity at the same time the shrapnel balls are discharged, and the wounds resulting therefrom are similar to those caused by bursting shell.

This latter class furnish the most frequent and severe cases with which modern military surgery has to deal. A shell fragment is of varying size, from a pea to the size of a hand or larger, is the shape of part of a cylinder, the edges of which are a succession of sharp-edged spicules. The wounds are of the extensive lacerative variety, and there seems no limit to the capacity of these fragments to mangle human tissue, varying of course with their size and velocity. Bayonet wounds are rarely seen in hospitals because of their usually rapid fatal termination.

We have spoken of the facilities which are now afforded for early operation in cases of wounds of the head or abdomen. As a rule, head cases are given absolute rest and quiet, and otherwise treated expectantly. When pressure symptoms present, the trephine is immediately resorted to. The bur trephine is used in conjunction with a bone-cutting forcep, to effect a hole somewhat larger than we usually see it. Cushing's trap-door is never used. The dura is laid open and the foreign body, blood clot, etc., removed. Hemorr-

hage, when it occurs, is controlled by packing and the dura is not sutured. The wound is permitted to heal by granulation. Hernia cerebri is taken care of by pressure dressing after infection has passed. Brain abscess is not as frequent as one would expect in the presence of infection, and this is due to the open method of treatment. The results obtained really compare favorably with those obtained in brain surgery of civil life.

Chest wounds are fairly benign in character. Especially is this true of those caused by the rifle ball. They usually recover rapidly under expectant treatment. The temperature of the first few days is not a source of alarm, and only when it persists is trouble looked for. In one of our cases the rifle ball surely could not have escaped penetrating the right auricle, yet after the first few days of temperature and slight haemoptysis, the patient did well and was on his way back to the firing line in about three weeks. The usual complications are haemorrhage, infection and mechanical obstruction. Haemorrhage does not usually exist over three days and is rarely troublesome. Projectiles in thel ung parenchyma are usually left alone, but effort is always made to remove them from the pleural cavity, though it is not always easy to make an exact localization. Superficial emphysema is absorbed very slowly at times—in one case it persisted for seventy days.

Infections are frequent and call for operative interference as soon as discovered. Radical resection is favored with the suturing of the pleural edges of the corresponding skin edges, to insure good drainage and minimize the formation of pus pockets. Irrigation with warm hydrogen peroxide is extensively used and never seems to cause the shock that the books on surgery tell about. Persistent sinuses give trouble occasionally—in two of my cases a Schede operation effected a favorable result.

Treatment of penetrating wounds of the abdomen is not all that could be desired. The statistics obtained from cases in which early operation is performed do not seem much better than those obtained by rest alone. Even when the cases are brought in soon after being wounded, they come at night when it is uncomfortably cold for even a sound person and there has not yet been devised an efficient method for heating the ambulance. This adds insult to their already shocked condition and they are unfavorable risks on arrival. But the peritoneum is almost invariably soiled and injury to the viscera is common, so if they are not operated on before the first twelve hours the prognosis is very bad.

In view of the great penetrating power of the rifle-ball, penetration of the abdominal wall without injury to the intestines is rare, though it does occur. Simple perforations, even if multiple, usually recover, but the cases with many lacerations furnish a terrific mortality. It is a fact, that soldiers in dangerous places and therefore on short rations, have a lower mortality in abdominal wounds, because of a relatively empty gastro-intestinal canal. The destruction to the tissue of the kidney and spleen usually necessitates radical extirpation, although hemorrhage from liver wounds are sometimes controlled by packing. Ether lavage after operation is used as a routine measure. The mortality is somewhere about 70 per cent.—40 per cent. of this number die from shock, 20 per cent. from peritonitis, and 10 per cent. from haemorrhage.

The buttocks are the most frequent location for wounds, especially of those from shell fire. This is probably due to the crouched position the soldier assumes when a shell shrieks toward, and strikes just behind, him, and literally splashes him with its fragments. Fractures very frequently complicate injuries to the extremities. The ever-present infection must be controlled before permanent mobilization is instituted. After a few days the temporary splint is discarded and plaster applied. The region of the wound is never covered by the plaster, which is put on as a cast above and below, and then connected with plaster bridges which are reinforced with wire-splinting. This facilitates

subsequent dressings, and the wonderful physical condition of the soldiers is reflected in the manner they really grow bone to bridge the gaps made by the removal of the splintered fragments. In spite of all efforts, osteomyelitis frequently complicates.

Injuries to the joints, especially the knee joint, even when caused by the comparatively benign bullet, usually end in a purulent arthritis which is sometimes cured by ankylosis after a long period of treatment, but may be complicated by a septicaemia which necessitates amputation. For this reason immediate resection is preferred, as it gives a fairly useful limb with a much lower mortality.

The various infections furnish the principal complications to injuries and the shell wound variety is the principal offender. Life in the trenches cannot be made sanitary, in spite of all efforts. The soldier's only relief from the mud and grime is afforded at the various bathing stations, but while fighting in the trench, his clothes and skin necessarily become encrusted with dirt and mud. Belgium is an agricultural country and its soil has been highly fertilized, principally with animal dung, it is naturally low and has recently been inundated. It is literally loaded, therefore, with all varieties of anaerobic bacteria, which are added to by human dejecta, because conditions do not always permit the use of the kaolin clay cabinets or latrines which are built in offsets at various intervals along the trench.

When a soldier is wounded by a penetrating missile of a more or less blunt character, it usually carries before it and into the deeper parts of the wound a perfectly punched out piece of his clothing. Thus we find, when cleaning up, cloth layers corresponding to the woolen outer and cotton inner garments which will exactly cover the presenting surface of the missile. This condition readily accounts for the high percentage of anaerobic infections in this war, especially of the northern section of the western front. Principal of these are tetanus, which fortunately is efficiently controlled by virtue of the universal use of prophylactic doses of antitoxin, and gas-gangrene.

Gas-gangrene is by no means a new entity. We occasionally see it in civil life, among that class of industrial accidents which cause a dirt-laden and lacerated wound, as in railroad injuries, etc. The large non-motile anaerobic bacillus, discovered by Welch of Johns Hopkins and known variously as the gas-bacillus, bacillus aerogenes capsulatus, or bacillus perfringens, leads a saprophytic existence in the soil and is found normally in the intestines of all mammals. When carried into the deeper parts of a ragged wound on a piece of muddy clothing, as above described, it finds a favorable place for a foothold. That it is carried in from the skin is shown by the higher percentage of infected wounds about the buttocks. A striking fact is that of all the wounds of the hands and face, admitted to our hospital, but one face wound developing gas is reported. These locations are the only ones in which opportunity of at least a resemblance of cleanliness is afforded and its prophylactic value is well testified to.

The period of incubation depends largely on the virulence of the bacillus, and to this cause can also be ascribed slight differences in clinical manifestations and the efficacy of various methods of treatment. At our ambulance, a very virulent form was met with and the incubation period was consequently short. It became an almost hard-set rule that a case which failed to develop gas-gangrene in forty-eight hours was safe, and that the cases that developed after the third day were very few and relatively amenable to treatment.

The constitutional symptoms are malaise, anorexia and furred tongue, and the rapid rise of the pulse rate, often without a corresponding rise in the temperature. Listlessness is soon noticeable, and at this point the local symptoms rapidly go on to the well marked picture in a few hours, so that a case that was apparently doing well at the time of the morning dressing may be

absolutely hopeless at noon time. The local symptoms are as follows: (1) a mottled brownish discoloration of the skin with indefinite borders, (2) a crepitus best elicited by a razor drawn over the skin surface. The feeling that one gets on palpating the ordinary subcutaneous emphysema was absent in our cases, probably because the development of gas was principally beneath the deep fascia. (3) Rapid enlargement of the part, which becomes very tense. The tense enlargement with discoloration and temperature met with in cases of deep haematoma has not the resiliency on pressure that we find in gas-gangrene. (4) The unmistakable fetid odor, of a sweetish, nauseating character, soon develops; at this point the toxins overwhelm the patient, coma succeeds listlessness, and death rapidly intervenes. When a case progresses thus far, the diagnosis can easily be made from across the ward.

So prevalent was this trouble in our sector that every case was potentially one of gas-gangrene and the treatment on reception was governed by this fact. Bitter experience had demonstrated the futility of conservative treatment and "debridement" was the rule. It consists as follows: The entire skin area, in the case of a limb for instance beyond the articulations to each side of the wound, was carefully shaved and the skin disinfected with green soap, alcohol and tincture of iodine. The overhanging skin edge of the wound was next completely excised, and all the soft parts whose vitality was liable to have been lowere were removed, so that the resulting wound was funnel-shaped, with its smallest diameter internal and the sides of smooth, healthy tissue, free from all projecting pedicules. Hydrogen peroxide, 1:8, was used as lavage twice daily for the first several days, and thereafter once daily. If the wound was narrow and deep, the course of the projectile was locatd by means of a blunt probe and a channel cleaned out, so that through and through drainage could be instituted. The pieces of clothing before referred to would usually be found somewher along the course of this channel. Fenestrated rubber tubing was the drainage means of choice. Whenever an exit wound was not found and the projectile could not be easily located, an immediate X-ray was taken, as it was an unpardonable sin to leave any foreign body. This line of treatment gave birth to some terribly large gaping wounds, but it effectually removed most of the infecting material, afforded perfect drainage and minimized the development of gas-gangrene; and when the wound was entirely clean, a plastic operation reduced the healing process to about two weeks.

When gas-gangrene developed in spite of this treatment, we usually had a virulent germ growing in an unfavorable place. If caught early enough, the part was incised, when the gas would discharge with a characteristic pop, the subcutaneous fat would be found to be darkened and watery, and the muscle black and friable. Radical cutting away of necrotic tissue with dressings every thwo hours and hydrogen peroxide lavage and the deep injection of oxygen gas and general stimulation gave results in the milder cases; but immediate amputation, well above the highest limits of the process, was necessary in the severe type.

Much has been said of the efficacy of Dakin's fluid in gas-gangrene. This fluid is a solution of sodium hypochlorite and sodium carbonate of definite strength, which has been filtered through boric acid, so that it is just acid to phenolphthalein. It is a powerful germicide, capable of killing staphylococci in two hours. Solutions of chlorinated potassium and sodium are not new as disinfecting agents, but are destructive to living tissue because of their alkalinity. The new solution has not this disadvantage even in the fairly concentrated form in which it is used, and besides seems to possess the wonderful property of dissolving necrotic tissue and practically steriliz-

ing a wound in about twelve hours. It is used either by the drip method or as a frequently changed wet dressing. Its field of usefulness is apparently very great, but familiarity with the rapidity and virulence of the sort of perfringens infections which have but a two-day incubation period, would lead one to think that this therapeutic measure would not enjoy so much success, as it has with the milder infections that have developed only after five to seven days, in spite of the fact that "debridement" had not been performed and favorable anaerobic conditions had therefore existed. I should like to hear of the results of Dakin's fluid against "G. G." in the northern sector.

All of the pus-formers were met with in our infections but pyocyaneus was the most troublesome and persistent, especially in cases of bone infection. Alcohol and formol solution gave the best results, usually in the form of continuous wet dressings. All things considered, the use of peroxide gave quite favorable results in the other varieties of infection. Though the oxygen atmosphere that it lent the wound was small, it had the property of loosening up old blood clots, etc., and had the mechanical cleansing effect of copious lavage without the irritating effect of other and stronger so-called antiseptics. I personally think that the old methods of Lister will be eventually forsaken for the newer methods of Wright, who has been doing careful and highly scientific research into the matter of wound healing. He announces his preference for the application of hypertonic salt solution, with sodium citrate, which promotes the outflow of lymph without permitting its coagulation. This "lymph lavage" is said to be favorable to phagocytosis and prevents germ development.

Secondary haemorrhage is another troublesome complication of wounds. It is sometimes caused in a secondary way by the erosion due to pressure of hard drainage tubing, but the primary cause is always infection. One of our cases was of the right femoral, just below Poupart's ligament. The external iliac was tied off and the case did remarkably well until a concomitant compound fracture of the femur became infected and necessitated a higher amputation. Most of the other cases were the smaller or terminal arteries. The calf of the leg is a frequent seat of persistently recurring haemorrhages, often of the posterior tibial, which is sometimes controlled by ligation or the haemostat left in situ and tight packing, but when the veins let go, loss of blood is so rapid that it necessitates amputation. Anaemia is a frequent sequel and calls for transfusion, usually by the indirect method with sodium citrate to prevent coagulation. Our American crew had considerable trouble in procuring a donor but finally succeeded in transfusing a case by the Bernheim method with excellent results.

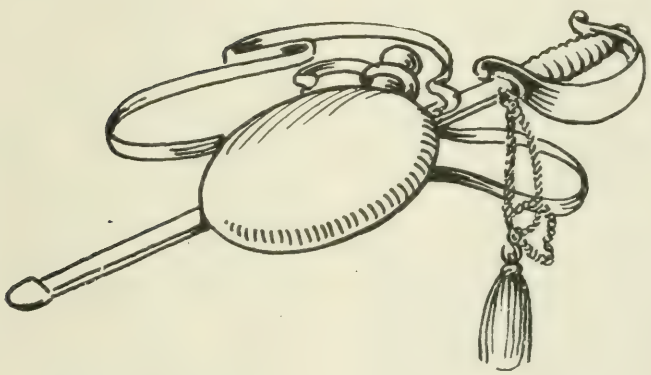
The question of when to amputate in war-surgery is very difficult indeed. I am quite sure that more damage is done by conservatism in the cases of infection that ultimately do recover with a more or less useful limb, but with the pathologic consequence of a long period of temperature and toxemia, such as amyloid changes in the liver, kidneys, etc. In this way they are invalided for life and made objects of charity, when prompt amputation with later fitting of a modern and wonderfully efficient artificial limb would have made a useful citizen. The coupe-de-hashe method of amputation is now universally used. It consists of a straight amputation without effort to make a flap. The skin and muscle are cut through above the wound and down to the bone, a pie-plate retractor is used on the soft parts, and the bone sawed through. The arteries are tied off, and the nerves put on the stretch and cut off short. This method is amply justified by the universal presence of infection, the conservation of tissue and the minimizing of shock. When all danger of infection has passed, a secondary amputation is performed and a flap

made. Very good results have been obtained in reducing the necessity for secondary flap operations, by applying traction by means of adhesive plaster strips, and weight attached to the skin about the stump, which gradually draws the muscle and skin over the bone during the process of healing.

The following statistics are from the last 2,000 or more cases to June 30, 1915, at the hospital in La Panne:

Wounds from rifle ball	497
Wounds from shrapnel ball	94
Wounds from fragment of shell or shrapnel	1,074
Accidents	203
Fractures	179
Contusions	108
Causes undetermined	48
Total	2,203

The mortality of these cases was 233, which is approximately 10 per cent. Of the remainder, another 15 per cent. were probably invalided from the military service after leaving our hospital, while something over 75 per cent. returned to the firing line. This hospital received only the surgical cases of a more or less severe nature, and these statistics therefore give ample testimony to the ability of its director, Dr. Anton Depage.



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MODERN METHODS OF SEWAGE DISPOSAL

Read before the Winnipeg members by the late F. J. Johnson, A.R.S.I., Superintendent of Scavenging, Winnipeg Health Department

(Continued from last month.)

THE next system of preliminary treatment is probably the most commonly used and so far, has proved the most efficient, namely, "The Septic Tank." It was invented by Donald Cameron, surveyor of the City of Exeter in 1894.

The aim of the "septic tank" is to bring the sewage into such a condition by arresting the solids in suspension as to make the filtration on artificial filters practical; at the same time taking advantage of the solvent action that goes on in the arrested solids, so as to make the quantity of deposit or sludge as small as possible.

The tank consists essentially of a chamber through which the sewage is allowed to flow continuously, the inlets and outlets being preferably submerged so as to prevent the disturbance of the scum which forms on the surface. It differs from the cultivation tank in that no material is furnished for liquefying-bacteria to cling to, but resembles it in that the conditions maintained in both are anaerobic.

The efficiency of the septic tank as an instrument for the liquefaction of sewage-solids is indisputable. The proportion of solids destroyed is largely dependent on the composition of the sewage and the presence or absence of solids from manufacturing processes and road washings. The effect of the latter on the proportion of solids destroyed would vary with the paving material, macadamized or asphalt roads yielding much insoluble matter, while the fibrous debris from wooden pavements would be susceptible of a certain amount of change. Another very important point which is often lost sight of is the length of time during which the tank has been in operation, and the period elapsing between its being thrown out of work and the measurement of the solids therein. It is obvious that a tank capable of digesting say 80 per cent. of the solids might be emptied at a time when only 60 per cent., 40 per cent. or even 20 per cent. had been destroyed, and that in any case in which the amount of solid matter is measured while the tank is in work, or immediately afterwards; there will be a large amount of such matter present which has been exposed for a very short time to bacterial action. The amount of solids digested does not for practical purposes afford a full measure of the efficiency of a tank in this respect, to arrive at which the bulk of the residum, as well as its weight, should be taken into account.

A point which to local authorities will be of even greater importance than the absolute quantity of the residum to be disposed of is the frequency or otherwise of the occasions on which the matter must be removed. With certain kinds of sewage, or with tanks of inadequate capacity, this may have to be done at short intervals, say every twelve months. On the other hand tanks have been known to be in continuous operation for years without being cleaned out.

The value of the septic tank in its relation to the subsequent treatment of the sewage may be briefly summarized as follows:

First it mixes the sewage as it arrives from hour to hour, and produces an effluent of a much more equable composition to go on to the beds, so that these are not subject to very considerable changes, either in the way of acidity or alkalinity or whatever it may be, according to the material that comes down. And further in the septic tank apparently the process that goes on has a tendency to disintegrate the suspended matter that is very much more easily retained on the surface of the bed, or if it penetrates does not hold the water to the same extent. That is to say, if you take a bottle of crude sewage, or even of simply settled sewage, the suspended matter floats about it in a sort of emulsion, and does not show any tendency to settle ; if, on the other hand, you take septic tank effluent it may be very black in appearance, worse perhaps at first sight than crude sewage, but if it is allowed to stand in the bottle for a short time all this black suspended matter settles down quite cleanly to the bottom, and leaves a fairly clear effluent to be dealt with on the bed, and this suspended matter when it gets on the bed allows the water very readily to penetrate through it.

Another advantage of the septic tank is, there is no cost in chemicals.

It is also generally accepted, although the experiments at present are only preliminary, that the actual chemical changes which go on in the septic tank are anaerobic changes, such as to produce compounds which are readily oxidized when turned on to the beds. It has also been proved that it is better and easier to break down sewage matter, by preliminary anaerobic action followed by oxidation, than if the process throughout were one of oxidation.

Maturity of Tank.

The work of the septic tank being biological, and not mechanical merely, it follows that it will not obtain its full efficiency until sufficient time has elapsed to cultivate the proper bacteria in the requisite numbers.

When a septic tank is first started, a simple settlement of suspended solids takes place, and the effluent is similar in color to the sewage, being in fact mere settled sewage. Several weeks pass before there is any fermentation in the tanks. Then bubbles of gas begin to rise, very slowly at first, and after two or three months more actively, until about the fourth month accumulations of gas in the deposit come up at intervals with considerable violence lifting with them masses of the black deposit to the surface.

Thus it will be seen that if it takes months to develop efficient septic conditions, it would be a disadvantage to empty septic tanks when accumulations arise, because in that case you have to begin de novo, and lose many weeks before the septic condition is again developed.

But sooner or later the tanks require emptying and in order to overcome the difficulty large valves are provided near the bottom of the tank and small quantities of the sludge are removed through these at intervals and in this way a tank might go on working uninterruptedly for years.

Temperature.

Temperature undoubtedly plays an important part in the efficient action in septic tanks. Very severe temperatures, however, do not affect the tank so much as one would imagine. The writer has seen tanks frozen over to a depth of eight inches and the effluent was well above forty degrees, and in fine condition. In very cold climates it would be necessary to have the tanks covered, providing proper means of ventilation for removing accumulations of marsh gas which is highly inflammable. The temperature of the contents might also be raised by blowing in steam.

Engineering Points.

There are a few points in the construction of septic tanks that should always be considered. They will vary according to local conditions, class of sewage, etc., and do not affect the sanitary officer.

The tanks should be of a sufficient capacity as will hold the sewage long enough to cause efficient action to take place certainly not less than 24 hours. The larger the tank the better the effluent and the less trouble there is with the sludge.

Tanks arranged in series are sometimes found suitable as it is only necessary to remove the sludge from the first tank, the deposits in the others being so small as to

go on working for years without any cleaning out.

Whether tanks should be covered or not is purely a matter of climatic conditions, as is also the question of supplying them with artificial heat.

The question of offensive smells arising from the tanks in warm weather is also a difficult problem to deal with and the only remedy seems to be adequate and efficient ventilation.

Final Treatment.

Having dealt somewhat at length with the preliminary treatment of sewage, that being the part of modern sewage disposal that has received the most attention of modern experts, I will now pass on to the final treatment.

The main object of the final treatment of sewage is the oxidation of the ammonia and organic compounds resulting from the preliminary process to which it has been subjected. The oxidation of the ammonia produces successively nitrous and nitric acids which unite with the lime, soda and other bases present to form nitrites and nitrates of the latter. This series of changes is known collectively as "nitrification." The carbon on oxidation yields carbonic acid gas, which likewise combines with the bases in the effluent forming carbonates.

There are at least three changes which take place in bacterial beds or filters, namely physical, chemical and biological. Among the latter may be distinguished changes due to bacterial or plant life, and changes due to animal life.

In a new unripened filter, the physical effect is first apparent. The matters in emulsion and in many cases in actual solution, are retained by the medium of a process of physical absorption. Purely chemical changes may take place owing to condensed oxygen. Iron compounds such as iron sulphide are oxidized, also sulphurretted hydrogen to sulphuric acid, etc. Hypochlorites are oxidized to chlorates and this means is effectual in sterilizing sewage containing small quantities of chloride of lime. The biological changes are chiefly those concerned in the gradual conversion of ammonia into nitric acid, the process known as "nitrification" and the subsequent oxidation of the organic matter by means of the nitrate formed. But purely carbon oxidation changes must go on, the breaking down of dextrine and sugar and no doubt the processes started in the septic tank are carried on and complete themselves in the primary bed or in the upper layers of a continuous filter.

Bacterial Filters.

With two exceptions the final treatment of sewage is always effected in a filter of one kind or another. The first alternative is the "nitrifying" channel invented by Mr. Scott Moncrieff, but now abandoned by him in favor of filters. The other is the biological tank of the Oxygen Sewage Purification Company.

There are many varieties of bacterial filters, but they may be classified, roughly, under three heads:

1. Hand filters of naturally porous soil.
2. Artificial filters, formed from land of less suitable quality, and worked as land.
3. Artificial filters formed from special materials and worked in a special manner.

The first mentioned has been already dealt with under the heading of broad irrigation, and intermittent filtration on naturally porous soils.

In the second style of filter: wholly unsuitable land, such as clay and peat, is artificially improved and, although never so satisfactory as the natural soil, does in many instances act in a fairly satisfactory manner, and then only at a considerable expense.

Before passing on to describe the wholly artificial filters and their modes of working, it may be noted that the word filter as used above does not mean filter in the ordinary sense of the word. A filter is simply a system in which by placing obstacles in the way of particular matter you prevent its passing along with the fluid. In the case of bacteria beds we are not dealing with matter by mere mechanical straining out, we have rather, practically an accumulation of micro-organisms into a small space which do a certain amount of work on the material that is kept back for them by the mechanical part of the filter.

The artificial filters may be divided into two sub-classes, the first comprising those filters which are filled and emptied alternately, the object being to hold the effiu-

ent in contact with the filtering material, and the second those through which the liquid flows without being brought to rest therein. The filters included in the first subdivision are known as contact beds and the others will be referred to as flow filters.

The latter group may be subdivided still further into streaming filters through which the liquid is allowed to flow freely, and trickling filters through which it percolates in thin streams in contact with the air.

The action of a filter is two fold. First it separates mechanically all gross particles of suspended matter, and renders the effluent clear and bright; secondly, it effects the oxidation of organic matters, with those in suspension and those in solution, through the agency of living organisms. It is the preliminary establishment and subsequent cultivation of these organisms which is to be aimed at in the scientific process of purification by filtration. The ordinary putrefactive and other similar organisms commence the work by breaking up the organic compounds and converting them to less complex forms, principally water, carbonic acid, and ammonia, the nitrogen being converted into nitric acid. For this process to go on three conditions are essential: Firstly, the organisms must be supplied with plenty of air; secondly, there must be present a base, such as lime, with which the nitric acid can combine; and, thirdly, the biological action must take place in the dark, that is, in the body of the filter, and not in the liquid exposed to the light above the filtering material. Filtration on biological lines of sewage or other foul water containing in solution, but little free oxygen, and a large quantity of oxidizable organic matter therefore means:

(1) That the filter, by cautious increments, in the quantity of effluent, which in itself contains the necessary organisms, must be gradually brought to a state of high efficiency. This condition will be shown by the existence in the filtrate of a constantly increasing proportion of nitric acid.

(2) That the contact of the micro-organisms with the effluent to be purified must be effected by leaving such effluent at rest in the filter for a greater or less time according to the degree of purification required, the process being analagous to that of fermentation. The system employed in many places is to run the water straight through the filter, and thus allow insufficient time for the work, with the result that the filtrate is soon in an unsatisfactory condition.

(3) That after each quantity of filtrate has been dealt with, the micro-organisms must be supplied with air, which is readily effected by emptying the filter from below, whereby air is drawn into the interstices. The filter should stand empty for at least an hour previous to another filling, and a longer period of aeration, say twenty-four hours, must be allowed every seven or eight days.

The life of a coke breeze filter worked in this manner is practically without a limit. From general results obtained over a period of twenty years, it has been established beyond a doubt that there is no difficulty in obtaining any desired degree of purification by means of a system of filtration conducted on biological principles. If a higher degree of purity be desired than that indicated by the foregoing, it can be obtained by an augmentation of the filtering appliances in providing supplementary filters containing as a filtering medium burnt clay or the more expensive polarite, or as a final process the effluent could be aerated or chlorinated.

The difference between the contact system just described and what is known as the streaming filter is that in the former the bed is fully charged with the liquid and after being held in contact for a sufficient period is drawn off, whereas in the streaming filter the water stands on top of the beds, or just level with the top, and it is allowed to flow out only at the rate at which it flows in, so that there is no special rush of liquid downward through the material of the bed, otherwise it would act merely as a sieve, and you would get no quiet sedimentation taking place. But where the whole body of the bed is allowed to come into play by the liquid slowly finding its way down from the top to the bottom and into the under drains, you then get the maximum

effects of the beds used in this case as ordinary filters, the sewage matters deposited in them being destroyed in the course of time by the bacterial action. There is still another system of filters known as trickling filters. They differ from the streaming filters in that the effluent is not allowed to flood the surface of the beds, but is showered or sprayed on to them. This in some cases takes place continuously for some hours at a time, while at others the filters are fed intermittently. In every flow filter of whatever kind, the prime necessity is to distribute the effluent with approximate uniformity over its surface. Various means of distribution have been adopted consisting chiefly of perforated troughs or pipes of various designs that ensure a more or less efficient distribution. The majority of the trickling filters, however, are fed by what are known as rotary sprinklers. These vary considerably in design, but in principal they are as follows:

They consist of iron pipes pivoted in the centre of the filter, and having perforations on the opposite sides of the two arms from which the effluent is showered on to the bed, the reaction of the liquid against the sides of the pipe being utilized to rotate the sprinkler after the fashion of the ordinary lawn sprinkler. As the sprinkler revolves the points of impact of the jets are constantly changed, tracing out on the surface of the filter a series of concentric circles, the distance between which are governed by the spacing of the orifices in the pipe. It will thus be readily seen that the rotary sprinkler constitutes a simple and effective means for securing an intermittent application of the effluent to each part of the filter, in conjunction with a continuous flow to the latter taken as a whole. The interval between successive applications to the same spot varies with different distributors. The chief value of the automatic sprinkler system of distribution is that the effluent in its passage from the sprinkling arm to the surface of the filter bed absorbs a certain amount of oxygen which ensures thorough aeration not of the effluent only, but of the filter bed also.

A great deal might be written of the various merits and demerits of the various systems adopted to the biological treatment of sewage, but the time allotted to a paper of this nature will not allow of but an outline of these. There is, howere, but one aim and object in the modern methods of sewage disposal, namely: To prevent the pollution of our rivers and water courses with crude sewage to the danger of the public health and to produce such an effluent which will not putrify and which would be classed as good according to chemical standards and which might be discharged into our streams without creating a nuisance.

A desire has often been expressed that a standard of purity for sewage effluent should be laid down, but experts do not deem a standard advisable.

In concluding my paper, I would like to draw your attention to the fact that though much has been done to produce an effluent that will not putrify and that will comply with chemical standards, so far as I am aware very little has been done to eliminate micro-organisms of a pathogenic nature from the effluent and until that is done the efficient disposal of sewage cannot be considered complete.